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SOME TREE CONSERVATION THAT I HAVE SEEN

BY ROBERT SHACKLETON

SOME years ago I was driving through a wild and lonely region in Gallia County, Ohio, not far from the Ohio River. The loneliness increased; the scattered houses became fewer, until at length I would go for long distances without seeing even the rudest hut. Yet it was not a woodland of lofty trees, but of trees averaging sapling size or not much over. Now and then I came upon great, sod-covered charcoal pits, in the midst of cleared spaces, and once I passed a huge charcoal wagon, drawn by five yoke of oxen over the rough and rutted rocky road. And at length I came to a tiny village, clustered about a tiny iron furnace, where a special kind of iron was made from a special kind of ore found only there. And as to the trees, it was explained to me, that charcoal was the best possible fuel for that ore, and that the company had purchased a large tract of woodland, and had divided it so systematically into sections for the cutting of wood to make charcoal that by the time the last tree was cut and made into charcoal upon the last of the sections, there was wood ready for the cutting upon the first of the sections.

I remember how interested I was in the idea; for forestry was barely known in this country at that time, and such things as sustained management of woodland and allotment by area were entirely new to me. But it was illuminative, it was instructive, it was full of suggestion, that trees could be treated as successional crops.

In most cases, other than for charcoal, the use of the accretion of woodland need not mean and should not mean the cutting down of every tree

within a designated division, but only the scientific selection of certain trees for cutting; but that was immaterial. The important thing was that trees could be grown like crops, and that the product could be sold or used and leave woodland still remaining. Up to that time, broadly speaking, I had taken it for granted, as the majority of people still take it for granted, that trees were to be kept, for the sake of looking at them, or cut down and sold and forever ended.

I was to learn, a little later, in Germany, the most successful of countries in its forestry, that not only is woodland cultivated for its crops, as farmland is cultivated, but that if there is any difference it is rather in favor of the woodland, as to attention and care.

One day, in the Black Forest, I felt a sense of real shock. For I had been going through miles of splendid beauty, and my mind was full of the mystery and charm of the ancient woods and their ancient legends, when suddenly I came upon a clearing—and a paper-mill!

It seemed sacrilege. Had the Black Forest been given over to vandals? I had seen devastators at work in our own woodland, at home; I had seen immense sections saw-milled into bareness; but to find similar conditions in the heart of the Black Forest, that most famous of all forests, was too utterly deplorable. Indeed, it was practically unbelievable—but it seemed true.

Yet it was not true. For the paper-mill was permitted to use annually only the equivalent of the annual growth of a certain designated portion of the forest, and every tree that was cut was cut under supervision and as part of a



SCOTCH PINE NEAR BERLIN.

Thousands of acres of large forests near the busiest city in Europe. It pays better than it would as farm land.

thoroughly worked out system. In fact, the Oberförster of a German forest district is a man who not only uses callipers and rod and tapeline, but who calculates tree problems with elaborate algebraic formulas and has both arithmetic and geometry at his command. The combination of a German and mathematics is no light and trifling matter!

That paper-mill, and, as I was to learn, other paper mills, and various heavy consumers who used wood, for building or other purposes, outside of the forest, all took the wood on the principle of successional crops. The forest is none the worse for it, and the owners of the forest have the profit.

Great part of the Black Forest is owned by the Crown; parts are owned by the various States, by towns and villages, by churches, by corporations, by individuals; all make money from the forest, but all do it, with mere variation of detail, under the general system of using only the equivalent of annual increase, essentially, always, a matter of successional crops. They would no more ruin the woodland to get a crop than a farmer would ruin his farmland to get a crop.

I saw villages that not only paid their

taxes from the sale of the wood, but that also give to each citizen all the firewood he needs and, every year, some forty or fifty marks in cash; forest villages that are so prosperous as to have houses and streets electric lighted, and roads well built, and where most of the homes have telephones.

FORESTS ARE NATIONAL CAPITAL.

"Our forests are national capital, of which we permit ourselves to use only the interest," said an Oberförster to me; and when I remarked on the beauty of the forest through which we were walking, he said:

"Yes, it is beautiful; but you know that in Germany we do not set aside forest regions on account of their beauty. There must be land upon which cities and towns and mills and factories are built; there must be land upon which crops are grown for food; there must be land for trees. In the course of generations the relative proportions become sufficiently fixed for practical purposes, and the proposition so works out that the parts reserved for woodland are those not wanted for residence or manufacturing and which have not the good soil demanded by farms—in short, forests are maintained where

there are the poorest soils and the most undesirable locations. But," he concluded with a smile, "though we do not aim directly at beauty in our forests, beauty comes of itself: we worship utilitarian gods and they give us paradise."

Over and over again, there has come to me; when looking at the result of tree-care abroad, that what our own country most needs is a general sense of the practical financial value of trees; not merely a sense of sentimental value, but a realization of the basically important fact that conservation of trees does not properly mean merely keeping trees, but using trees; and that this is not alone a matter of the Government and our great forest but effects every individual who owns even a single tree.

A man with a fine maple or an elm in front of his house may properly look at it as a thing, not of picturesqueness alone, but of money value, for it aids to the money value of his place. I realized this vividly one day (and for that reason give the personal reminiscence) when a friend, looking at several big Nordmann firs on my own place, and first speaking of their attractiveness, added the remark, unexpectedly: "I suppose you would consider these trees, as they stand, worth two hundred and fifty dollars apiece." Other friends, be-

fore him, had spoken of the beauty of those trees but it had remained for him to put his finger on the vital consideration that alone makes tree preservation practicable. For the appeal of tangible value is far broader than the appeal of beauty alone.

A cluster of pines on a hill, a grove of beeches beside a sunny brook, an avenue of pin oaks—these are practical money additions to the value of a place; and they may soon, if properly handled, even become a source of income or firewood or both.

And it should never be forgotten that whenever an individual owner increases the value of his own place with things of beauty he benefits the community in general.

The French Government is not only liberal in its maintenance of splendid national forests but at the same time realizes this importance of what the individual may do. If an owner will plant trees on his hilltop or mountain slope, that land will be exempt from taxes, until at least there has been time for the trees to mature; and if he plants trees on other than hill land, three-quarters of the taxes is exempt. But if a Frenchman wishes to cut down a grove of trees he will probably find himself at odds with his local officials, who



SPRUCE PLANTATION ON RINGENBURG IN WURTEMBERG.
A farm bought by the King at over \$60 an acre to reforest.

will demand his reason for wishing to denude the countryside and will quite likely, after a great deal of discussion and delay, refuse him permission to do more than cut the equivalent of current growth.

It is never forgotten, in France and Germany, that individual tree culture is of importance to the community in general; that when a man adds to the actual money value of his own place, with things of beauty, he adds to the total wealth of the neighborhood. And realizing that the community is affected, the government acts logically and shows an active interest and a practical helpfulness. Germany does not actually overlook the acts of individual owners of woodland as much as does France, but it very carefully holds the power to regulate the management of corporation and community forests; and to woodland owners, whether individual or otherwise, it offers advice and information and very practical help; along such lines, for example, as lending money at low interest to encourage afforestation.

The care of trees, which is so new a matter with us, is a very, very old matter in other portions of the world; and not alone in Germany, the country that stands at the head in efficient present-day forestry.

It was, as an example, fascinating to be told, in a community forest on the slopes of the Eastern Alps, that the care of trees had been in vogue there for many centuries; that, indeed, so old records told, the Romans had actually had a school of forestry in that immediate region, and that other records tell of thousands of trees sent, centuries ago, to Venice, for the foundation and roof-beams of the palaces. "And the forest is still here! And every year after all these centuries, there are many, many trees cut from it."

That was it; that was the marvel of it, to an American; the forest had been used for centuries; it had furnished countless successional crops of timber; yet it was not destroyed, not a place desolate and bare. "The forest is still here!" The Italian who told me this—for it was in a part of the Alps now

in Italian possession—had no idea of the impression that he was making. For away from the forest flowed a river, the Piave, down which logs, many of them two feet in diameter, were floating on their way to market; and I had seen no such mass of logs in a river in America except when absolute and complete desolation was in progress. Yet this had been a logging streams for centuries! And it will be a logging stream for centuries to come! "The forest is still here!"

The Italian, a member of the governing board of a near-by town, went on to tell me of the profits of forest land, and of the financial benefits accruing from it to the people of the community, and it all pointed out, anew, what America still needs to learn—the practical and continuing money value of woodland that is properly used.

The taking it for granted that the active life of an active producing forest is so much longer than the life of any man, gave constantly an impressive undercurrent to his words. And as I stood there with him there came vividly the remembrance of a German friend who, unconscious that he was saying anything unusual from an American standpoint, spoke in quiet and matter of fact phrases of his forest problems: "If a forest of 12,000 acres, worked on a rotation of 120 years—" and so on; taking it for granted not only that the forest is to continue longer than the life of any man but that it is to continue in productive usefulness. With us, the forest disappears, with a resultant desolation that will continue longer than the life of any man.

In America, there has somehow come the feeling, even with great numbers of those who stand for forest preservation, that forests ought to be saved on the same principle that a gallery of Old Masters should be saved; as a collection of things of art, worth preserving on account of sentiment and the love of beauty; of potential money value, in a sense, but not of actual and practical value so long as they are really preserved; that, in short, the only way to utilize them is to destroy them. This misapprehension is continually making



RESULT OF THE REFORESTATION OF LUREBERGER HEATH ON WHICH NEITHER GRASS
NOR TREES GROW.

This is two hours' ride from Hamburg or Bremen and four hours from Berlin.

itself felt; a misapprehension that needs to be removed by general inculcation of the truth that although forests are indeed like masterpieces of painting in that they are precious and beautiful, they differ from museums and gallery beauties in the radical and basic quality of offering actual money for intelligent use.

The old-time saying is undoubtedly true, that you can not eat your cake and keep it; but it is also and undoubtedly true that you can use your forest and still have it! But not if you demolish it.

A few days ago the representative of one of our manufacturing corporations was telling me of his efforts to buy wood. The developments of a side-line, really a comparatively minor matter with them, had made it important to get wood, and he had been traveling through half a dozen States making contracts for standing trees. I knew some of the wooded districts which he had bought—regions of beauty that should be used and not destroyed; regions where the taking of successional crops would help and not hurt, but which were now to be ruined.

"It has been hard to find enough trees to do us for the next few years," he

said. "I have contracted for wood in Virginia, West Virginia and Maryland, in Pennsylvania, New York and Ohio. We are to use up five acres of trees a day," he added, "and the owners of the land are only anxious to put movable sawmills and clean everything out." He grew indignant as he spoke. "If those owners were sensible they could have a steady income from their woods, instead of doing away with them in one sale and having neither woodland nor farmland left. I found them all alike. But, of course, all I could do has been to get wood for my concern, and I got it."

It interested me to notice that this city man, connected all of his life with manufacturing, could see so clearly the intelligent conservation that trees need, at the same time that the tree owners were blind to it; he was applying to a problem new to him a mind trained in scientific business economy and administration; but it also made more evident the evils of our present lack of system; for there really seems something more insidiously dangerous in such a denuding of scattered woodland throughout six States at the rate of over 1,500 acres a year, than in the frank cutting down of forests; for it has become

possible in some degree to arouse public opinion about forests, and secure protective laws, but thus far the public and the legislators have not been awakened to the value of minor patches of woods.

The concluding words of the buyer of five acres a day sounded grim to any lover of trees. For he said:

"We were in doubt about our ability to get enough wood within the necessary distance, and were therefore making alternative plans to do without it. And those plans will go into operation as soon as these woods are all used up." Succinct and ominous, that: there is no hope of finding a succession of trees.

I think that the use of the word "forestry," though it can not now be helped, has been in itself unfortunate through putting the minds of the public too much upon forests alone, instead of upon trees, as what is in need of protection and conservation. Reversing the old adage, it may be remarked that

such people can not see the trees for the forest.

It is astonishing, but many people do really fail to realize that a forest is made up of trees. And it is tree protection, tree conservation, the sensible, financial, profitable growth and use of trees, that America needs. To consider forests and neglect individual trees, is like considering cities and neglecting the houses, like considering an army and paying no attention to the growth and care of training of the individual man.

Splendid as are our protected national forests, noble as is the work of protecting them, successful as have been the efforts to arouse a sentiment in their favor, it is even more important to arouse a sentiment for trees, whether in forests, in woods, in clumps or in isolation. Take care of the trees and the forests will take care of themselves—for the forests are trees.

GOVERNMENT SELLS TIMBER IN CALIFORNIA AND ARIZONA

TWO sales of Government timber, aggregating over 51,000,000 feet, are announced by the U. S. Forest Service. The La-Moine Lumber and Trading Company contracts to cut 28,300,000 feet of saw timber from the Shasta National Forest of California, and the Saginaw and Manistee Lumber Company, of Flagstaff, has purchased 24,300,000 feet of green and dead pine and fir timber on the Tusayan National Forest of Arizona.

The California sale includes several kinds of timber at the following rates per thousand feet: \$3.25 for sugar pine; \$2.25 for yellow pine; \$1.25 for Douglas fir, and 50 cents for other species.

The cutting period is nine years, subject to a readjustment of stumpage rates in 1918.

The area on the Tusayan is near Williams, on the Santa Fe lines, which furnish ready access to the general markets. The timber is to be cut prior to December 31, 1915, and the contract price is \$2.50 per thousand feet.

In both these sales the timber will be cut by the companies in conjunction with timber owned by them in the vicinity. The Government expects to get an approximate gross return of \$115,000 from the two sales, of which about \$28,750 will go to the counties in which these forests are situated in lieu of taxes.

ENGINEERS REPORT FIRES

The Western Pacific Railway has instructed its engineers to report fires along the right-of-way where it traverses the Plumas National Forest, California. The location of fires is indicated on a card dropped by the engineer or fireman to the next section crew met after the fire is discovered. It is then the duty of part of the section crew to go back on handcars or speeders and put out the blaze.

STREAM PROTECTION IN THE SIHLWALD

By F. F. MOON

THE Sihlwald, the City Forest of Zurich, Switzerland, is probably the best known of all the European forests and is always a mecca for American foresters "seeing Continental Forestry."

Among the points which make it famous, the following may be mentioned; it is the oldest city forest in Europe, having been owned by Zurich since 853 and cut according to definite plans since 1384; it yields unusually high returns, giving a net revenue of \$7.25 per acre per year; it has been splendidly managed, for aside from the excellence of its reproduction, marketing methods, etc., it was actually normal until an unfortunate snow-break on September, 1885. (That is, the forest had been so cut and reproduced that all age classes were present and it was capable of yielding the same amount each year indefinitely.)

A visit to this superb forest last summer disclosed the fact that it was notable on another score, since it affords numerous examples of the splendid care the Swiss republic is taking of its mountain torrents; 10 per cent of the forest budget going for stream control annually.

The question whether or not to spend money on an uncontrollable stream is not optional with the men in charge of the forests in Switzerland. If, on inspection, a brook is declared dangerous by the higher officials, the men in charge of the forest must take steps to control it, the Government subsidizing the operation up to 40 per cent if the drainage basin is more than 24 acres in extent. Already the Swiss Government has spent from four to five million francs in this fashion, their work along these lines dating back about 20 years.

With the extent of the forest influence on run-off still to be decided in this country, the opinion of Forstmeister and his assistant is ex-

tremely interesting, for they lay the heavy damage done by the rampant Kellerbodenbash in the spring of 1910 to the fact that the drainage area was in process of regeneration at that time and the young reproduction could not check the run-off as well as the high forest which had previously stood on that site.

The actual technique of stream control within the Sihlwald may be classified under three heads.

1st. The protection of the channels of small brooks by log dams and slab facings. See illustration No. 1.) This form of repair is made necessary by the fact that the underlying rock, the so-called Molasse, is extremely friable and is easily cut to pieces by the quick running brooks. The cost of such an operation as the one shown in the illustration would amount to about \$20.

2. Log barrages along the upper courses of medium-sized streams with protection of the banks by means of log cribs. (See illustration No. 2.) These barrages, aside from preventing the cutting action of streams, form pools in which the speed of the water is checked.

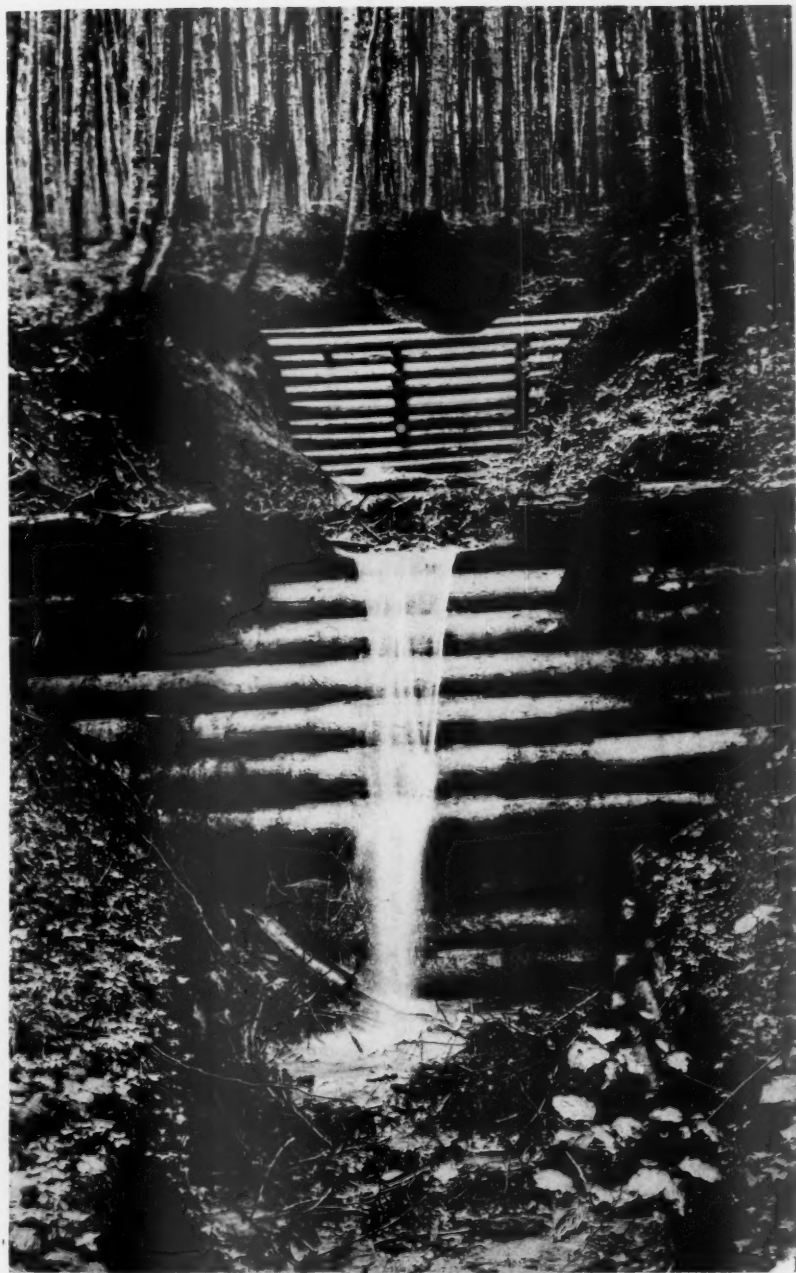
3. Series of stone dams, reinforced by concrete retaining walls, combined with cutting the banks away until the angle of repose is reached. (See illustration No. 3.)

The repairs made on the course of the Kellerbodenbach furnish a striking example of this sort of work. During a heavy rain a few years ago this stream washed over 400 cubic meters of sand and gravel upon the railroad tracks just below the road, tying up traffic for some time and costing a considerable sum of money to remove. The repair of this stream was thus made imperative.

The cost was estimated at 11,000 francs, but by careful management it was done for 9,000 francs. (Three hundred and forty cubic meters of



NO. 1. LOG DAM AND SLAB FACING ON SMALLEST BROOKS.
Cost about \$20. for a brook about 2 meters in width.



NO. 2. LOG BARRAGE AND CRIBBING PROTECTING UPPER COURSES OF A MOUNTAIN STREAM.

Logs are barked but will soon be coated over as water contains lime.



NO. 3. STONE AND CONCRETE REPAIR TO THE KELLERBODENBACH.
Total cost, including grading of the banks, about 9,000 francs.

stone and concrete work at an average cost of 20 francs per cubic meter, and 2,220 francs for cutting away the banks so that they would not slide down into the channel of the stream.) It is safe to say that this stream will cause no more damage for some time to come.

These three forms of protection constitute the extent of the forester's activities on the mountain streams, but their work had to be supplemented by Government assistance in controlling the main drainage artery of the valley, the Sihl River, before it was considered that a complete job had been done.

The Sihl, no larger than some of the so-called creeks in the South, during the high water of 1910 had ripped out many rods of the retaining wall that shielded the outer curve of the river bank, just opposite the center of the forest. This wall had been composed of open-laid stone which was not strong enough for the extra high water. A new wall was put in, composed of stone and cement running for nearly one-half mile along the outer curve of the river, at a cost of about 500,000 francs. So that now with mountain brooks checked by means of log and

concrete barrages and weak spots in the river bank protected by masonry the safety of the valley seems absolutely certain.

While, of course, few European methods may be used in this country without change, nevertheless we may adopt their principles and execute them according to the different economic conditions that obtain in this country. Therefore, it seems that we may safely draw the following conclusions from the experience and methods of these Swiss foresters:

1. That forest cover while of great importance is not alone sufficient to control run-off in regions of steep slopes and heavy rainfall. The cover must be reinforced by storage reservoirs both large and small.

2. That good forest management demands efficient stream control to prevent recurring expenses even at the price of a considerable initial outlay for the permanent improvements.

3. That Federal and State aid in the prevention of stream damage and floods should be made an important part of our conservation policy.

GOVERNMENT SELLS MONTANA TIMBER

A SALE of 85 million feet of Government timber from the Flat-head National Forest of Montana is announced by the Forest Service. The Somers Lumber Company, of Somers, Montana, were the buyers.

The contract approved by Chief Forester Graves runs four years. The area specified includes 9,280 acres in the Swan River and Swan Lake watershed, about fifty miles north of Miss-

oula, Montana. Larch, spruce, white pine, Douglas fir, yellow pine, and cedar are all represented in the saw-timber woods, and cedar poles, piling, and kindred products are mentioned by the terms of the sale. For saw timber of all species the Government gets \$2 a thousand feet, board measure, \$1 per hundred for 7-foot posts, 2 cents per linear foot for piling, and from 15 cents to \$2.80 apiece for cedar poles, according to size.

AUSTRIA'S TIMBER SALES.

Austria not only sells timber but timber products from its forest lands, and disposes of about 1,500,000 railway ties a year. There is no provision in the United States by which the national forests can dispose of manufactured lumber, though the policy of selling standing timber is well established.

A PLAN ADEQUATE TO MEET OUR NEEDS FOR WOOD TIMBER

An address delivered at the annual meeting of the Society for the Protection of New Hampshire Forests, Lake Sunapee, N. H., July 23.

BY DR. B. E. FERNOW, *University of Toronto.*

THE title which Mr. Ayres has chosen for me to discuss is much more ambitious than my remarks will warrant, for I have no special plan to propose or to advocate, and shall not try to do more than to throw out suggestions and reflections on the subject and point out the need of an active campaign in a particular direction.

Mr. Ayres not only furnished the title, but also suggested the subject matter on which I was to talk, namely, on the lack and the need of application of the most important branch of forestry—silviculture, and more particularly on the lack and need of planting operations on a large scale.

There is now probably nobody inside or outside the forestry associations who has not grasped the fundamental idea and object of forestry to be to reproduce the forest crop which we have utilized, and, if possible, in better form: Forest production, or technically speaking, silviculture, is the keynote of forestry.

There was a time when this truth was not recognized even in the membership of the forestry associations, and, indeed, we are still suffering from the consequences of the delusions of our friends as to what forestry intends. There is still in the constitution of the State of New York that foolish clause which prevents the State from practicing silviculture on its own lands—except by violating that fundamental law.

Practically, when we look over the whole United States outside the National Forests, there is in comparison with the extent of utilization of timber little attempt to reproduce excepting as kind nature unaided, or rather impeded, can accomplish.

If, as is claimed by some, we are cutting three to four times as much as the annual growth on our whole forest area, it would appear that something more positive than protection against fire and more conservative use is necessary to supply the future needs of wood and timber. There must be a deliberate effort to catch up with the cut by reforestation of lands now not productive as well as by improvement in the increment of productive areas—the practice of silviculture!

We must realize that our population is still growing at a greater rate than that of other countries, and with it our requirements, and while there is undoubtedly a reduction in the use of wood going to be forced upon us—from the 250 cubic feet which we are consuming now per capita to the 37 cubic feet which Germany can get along with, or even the 14 cubic feet which satisfies the Englishman—it is not readily going to adjust itself to the increment which under present methods we can figure out as probable.

I may here recall from the Report of the National Conservation Commission an attempt to arrive at a production figure. The data in various parts of the report do not agree, the total forest area, for instance, being stated varying from 545 to 700 million acres. Accepting, however, the statement of 580 million acres as probably nearest the mark and making proper allowance for the changes which have taken place since 1907 when the estimates were made, the present condition of this area would be, as far as not turned into farms:

Mature timber, 265 million acres; cut over lands, restocking, 225 million

acres; cut over lands, not restocking, 80 million acres.

To this latter area must be added 80-90 million acres of openings, or of scrubby woodland within the mature timber area. Since the mature timber area does not make any new growth we have then more than half the total area non-productive as far as the future is concerned, only 225 million acres of culled area restocking as nature left to itself may do. Nevertheless, on this total area an average annual product of 28 cubic feet per acre is estimated by one writer in the cited report, representing possibly 20 billion lumber feet, or half our present cut. Another estimate makes the growth 72 lumber feet per acre which would about cover our present annual cut.

Considering that the *managed* forests of Prussia, on a very much smaller area (less than 7 million acres) produced in 1850 precisely the amount of 28 cubic feet per acre, we may feel assured that this production by unaided nature is most likely an overestimate, as far as useful material goes, and that we are justified in believing that our present consumption exceeds by more than double the annual growth.

And since, according to the same authority, there is hardly 30 years' supply in sight, the time for delay and dilly-dallying with Nature's good will is certainly passed, and positive measures are becoming urgent.

Even if the remainder of uncut timber were all handled under what is called the method of conservative logging, as at present understood, it is questionable whether our requirements for the future can be secured, and the situation much changed.

We should understand the true inwardness of conservative logging. In the first place, it means a more careful utilization of the existing natural crop; secondly, it involves leaving a part of the crop for additional increment by restricting the cut to a certain diameter; thirdly, if applied to the fullest extent, it means leaving here and there seed trees, that *might* help in securing a new crop if nature is kind, but it does nothing to *insure* such a new

crop or to assist its development, and since the financial condition of the operation prevents the removal of weed trees, the latter have at least as good a chance, often a better one, to reproduce as against the better species which are the object of the logging, and, which, by this very fact, are constantly reduced in the composition of the forest. If, then, fire is kept out, the trees left of the original growth will lay on additional increment, and in 20 or 30 years will have grown to desirable log size, permitting the logger to return for another harvest; but there is no assurance that a new, *young* crop will spring up and take the place of the original, nor, if such crop if perchance it should establish itself will be of the right kind and will in the shade of the left-over trees develop advantageously.

Conservative logging, then, is rather concerned with a more conservative *utilization* of the present crop, and has only a subordinate element of concern in the future crop—of silviculture—in it.

I do not deny that the heart of the lumberman may open more readily to the advocate of conservative logging than to the silviculturist, for the former promises him a better present or short-time financial return, while the latter invites him to invest for a long run; but we must not expect from it much toward a solution of our problem of supplying the future, which can only come from an application of real silviculture.

It is true the practice of silviculture presupposes safety of property, and hence, as long as the fire danger is excessive, the lack of interest in such a hazardous crop, and especially in the expenditure of money in establishing it, can be easily understood. In the last few years it seems, however, that the efforts in subduing the fire fiend promise success, and hence times are better for pressing the need of active efforts at crop production—the practice of silviculture.

Immediately we raise the question as to what methods of silviculture we are to apply, we are in the field of controversy and disagreement among the doctors.

I hope, however, that it can not happen any more, as happened only three or four years ago, that an agent of the U. S. Forest Service would swear in court that the selection forest method is the only applicable one in our mixed and cuiled forests. Nor will today the sneer and scoff with which a high Forest Service official, 10 or 12 years ago, passed judgment on our nursery at Axton in the Adirondacks as a useless splurgy performance, find an echo.

I hope we have taught enough of the young foresters what the physicians know, namely, that each case can be doctored only after special diagnosis; that there is no universal medicine; and that each medicine has its value in a particular case.

Nevertheless, we must admit that there are at least two distinct types of treatment to choose, and that there are, as among physicians, the allopaths and homeopaths, two schools of silviculture, which have been contending against each other for nearly a century even in the home of forestry, in Germany, namely, the advocates of natural regeneration against the advocates of artificial restocking.

And, as in medicine, the wise man smiles at the one-sided advocates of any one special form of treatment and practices an eclectic system.

Natural regeneration, as the name implies, relies to the largest extent on Nature to produce the crop, the seeds from the existing trees are expected to seed the area to be regenerated, and as the old crop is removed, the new crop takes its place—conservative logging with more consideration of the needs of the young crop. In artificial reforestation, the seeds are gathered and sown by hand or machine, or else, preferably, trees are grown in the nursery and planted out by the use of various tools. As a rule in the former method the old crop is more or less gradually removed; in the latter method, as a rule, the old crop is cut clear, and possibly the ground prepared for the new crop.

There are two points of view from which every forestry practice must be tested, namely the biological one and the financial one; does the method pro-

duce satisfactory *material* result and at the same time keep the factors of production, especially the soil, in good condition? And, on the other hand, is it as cheap as a satisfactory *financial* result makes it necessary?

In farm practice, each year's, or a few years' crops, give answer to both questions, but in forestry unfortunately the result is seen only after a very long series of years, and hence the possibility of such an unending controversy between natural regenerators and planters.

This long-time element makes, for instance, all finance calculations speculations in futures, without very certain data.

What prices will rule 60 to 100 years hence? What interest rate is it proper to charge or expect on the invested capital for such a long time investment? Indeed, will not industrial development perhaps have eradicated the use of wood, or at least of wood of the kind we have set out to grow? This latter question has in the last century been a serious one for the beech forests of Germany. Originally fostered and increased to meet the need of fuel wood, the development of the use of coal made them unprofitable; then having revived as furnishers of tie timber with the railroad development, the metal tie threatened to displace them, and but for the fact of a broad national policy under which both forests and railroads are managed by the German Government, the metal tie would have killed the beech forest industry.

Nevertheless, we must act as if the future were ours, and as if the use of wood is assured forever, for which the vast amount of its present consumption and other arguments give warrant; although the extensive growing of anything but general purpose woods is to be carefully considered.

A few reflections regarding wood prices will perhaps help to clear the situation as to future values. Prices are local, continental, and international or world prices. Eventually, there is for every material or limited supply, as wood must ultimately be, a price level which only distance to market can vary. In the end, also, prices of manufactured

or produced goods must at least equal minimum cost of production. At the present time, while there are still large supplies of wood available, the free gift of nature on which no cost of production needs to be charged, prices in this country at least remain below the cost of production; and even in Germany they remain below a fair business charge, because of the competition of these free supplies. The cost of production in the German State Forests at present is at most about \$4.75 per M feet, not including interest on the capital involved, and with a reasonable allowance of such interest charges, around \$7.00 per M feet.

On over 10,000,000 acres of State Forests, the production of stout wood (over 3 inch) was, in 1910, 73 cubic feet per acre, of which 65 per cent or 48 cubic feet was log material which may be translated into around 400 feet B. M. The total expense per acre was \$2.45 which if the whole is charged against log material makes the cost of production 1 M board feet cut in the woods around \$6, from which deducting wood choppers' wages of \$1.25 leaves the cost of stumpage \$4.75, while the average price per M feet in the woods cut—i.e., of logs, was \$16.65.

With us, due to difference in labor prices, this cost of production may be doubled and rounded off upwards to \$10 per M. When, therefore, stumpage values have reached the \$10 mark with us we may feel assured that the business begins to pay, hardly before.

Is there any likelihood of this value to be reached? Here again we can only argue from past history and from the knowledge that timber supplies are limited. In Prussia, during the last 80 years—and no shorter periods need be considered—wood prices have risen at the average rate per year of one and one-half per cent—that is to say, they have more than doubled. In our own country stumpage of white pine in the last thirty years has quintupled, and in the last ten years doubled, and, indeed, has reached the figure at which it will cover cost of production and leave a profit. And as everyone knows, *all* wood products have for the last two decades

risen speedily, as the knowledge of limited supplies has become realized. While for most species the stumpage values are still far from what it would cost to produce them (they are mostly in the neighborhood of \$5), it can be safely asserted that the time when this will be the case and when the price level of European markets will be reached will be here before any plantations now made will be ready for harvest.

Hence, we will be justified in assuming for long-time calculations the present European prices as reasonable and very safe expectations.

The interest rate at which European foresters figure their business rarely exceeds 3 per cent; but this does not mean that the business pays that rate on the originally invested capital or investment value, which is not at all known. It means merely that the *sale* value of the wood and soil capital yield a 3 per cent revenue, but as wood prices change so does the value of the capital. If we take the value of the forest capital at any given time in the past as the investment value and compare it with the present net revenue the relation is entirely different. For instance, 10 million acres of State forests in 1900 were valued from their net revenue with a 3 per cent rate as at that time worth \$700,000,000 or \$70 per acre. In 1910, these same acres brought a net income of \$2.78 per acre or somewhat over 4 per cent on the valuation of 1900, but if still earlier valuations are taken the actual earnings would show at much greater rates. For instance, Prussia in 1880 had 6.5 million acres bringing a net income of just about 6 million dollars, which capitalized at 3 per cent would make the forest value \$200,000,000, or only \$30 per acre. On this valuation the net income of 1910 of \$2.26 per acre would represent over 7.5 per cent dividend.

If we can therefore manage as well as Prussia—and there is no reason why we could not—we are justified in figuring our business rate in forestry with present valuations of forest investments at the usual business rates for similar investments.

After this digression we may return

to our discussion of the two silvicultural schools.

The advocates of natural regeneration claim financial superiority in that the first cost of starting the crop is avoided.

This, however, is only seemingly or partially so, for with the exception of the strip method—which clears the ground in one operation as in the case of artificial restocking—every natural regeneration method requires a more or less *gradual* removal of the old crop and entails, therefore, the logging of a larger area for the same budget and return to the same area as well as more careful operation to save the young growth and hence involves greater expense in harvesting. Moreover, the financial result is not decided by the first cost alone, but by the final outcome. Success in establishing a new crop by natural regeneration is to the largest extent dependent on the good will of nature, or the luck which the manager has in getting the combination of favorable weather conditions with a satisfactory seed year, a good seed bed and proper light conditions for the young crop.

Even the best judgment and skill in securing a good seed bed and proper light conditions—which are the human contributions to the production—can not force success if the seed year fails or the weather is unfavorable.

The further development or progress of the crop also depends upon the skill of the silviculturist in gauging light conditions as the crop needs them—and this is by no means an easy or inexpensive task. In the end, almost invariably time is lost in the establishment and progress of the crop; the naturally regenerated crop as a rule comes to maturity later than the artificially started one.

It is then highly questionable whether finally the financial advantage is not after all in favor of the planted crop, although it requires a direct outlay. There is, however, one favorable biological feature of the natural regeneration processes, which is undeniable, namely, the continuous soil-cover which prevents soil deterioration. This, how-

ever, also is not infrequently more a theoretical and limited effect than a practical one, for, if after the opening is made, the young crop is not at once established, there is to some extent at least the same liability to deterioration as in the clearing and planting method.

Nevertheless, this feature remains the best argument for the natural regeneration, and vice versa, the fact that in the artificial method the soil is bared and that the planted crop on account of expense is less dense and closes up to shade the ground considerably later than in a successful natural regeneration, is the most valid objection to the planting method.

We must, however, not overlook that the need of soil protection is not everywhere prominent, and moreover, can be secured by advance planting before the old crop is removed, and by dense planting, perhaps with a cheap nurse crop. Planting undoubtedly costs money, requires a direct outlay, but its advantages are many, namely, avoidance of damage to the young crop in the operation of harvesting, independence of the harvest from the process of restocking, a gain in time, the possibility of the choice of species, the completeness of the stand which can be forced. If properly conducted it is a cheap and reliable method.

There are fashions in methods of operation as well as in clothes: natural regeneration was in fashion in Germany 80 to 100 years ago. This is the reason, so writes an authority from Wurtemberg, that the age class of 80-100 in the State forests is deficient. The fact that the beech area of Germany has since 1820 been reduced to about one-half of what it was is also in part at least ascribed to the failure of natural regeneration, this species being supposed to be capable of being reproduced by that method alone. Nature is still more obstinate than foresters, says a prominent writer in comment, and usually remains in the right: the cost of the quarrel falls to the loser.

By 1840, planting had become fashionable, especially in the pineries. In the 80's, under the leadership of Gayer, a reaction set in, and natural regenera-

tion came again to the front, at least in theoretical teaching, while in practice a larger and larger share was given to artificial restocking, so that now over 60 per cent of German State forests are managed under a clearing and replanting system. So anxious have the adherents of natural regeneration become that last year they saw the need of forming a special association for the advocacy of their hobby—an economic joke!

Meanwhile, magnificent stands have been produced by planting in the Prussian pineries and Saxon spruce forests, which are convincing. In the State forests of over 10 million acres, now, over two and one-quarter million dollars are paid out annually for planting.

Coming now, nearer home and admitting that intensive methods of silviculture may not as yet, even in State and National forests, appear to be practicable—although viewed from the standpoint of the future we hold they are—we may at least inquire what the conditions are that should direct our choice of method.

Thirty years ago a very wise nurseryman, Thomas Meehan, of Philadelphia, whose firm is still one of the best in the country, a keen biological student, did not hesitate to express his opinion that the only promising method of restocking our woods was by planting. At that time I was myself still imbued with Gayser's doctrines and stood up for natural regeneration. I am not now as radical as Mr. Meehan was, but I have come to realize the truth upon which he based his opinion. In our mixed woods, with species of unequal value, the culling process in many cases leaves weed patches, the weed trees regenerating in preference to the valuable species which are reduced in number by the logging operation. Unless, therefore, a way is found of subduing weed trees first, the new crop will not be of desirable composition. In many cases the accumulation of duff and litter on the ground is such that a satisfactory seed-bed can only be secured by artificial means. Thus the spruce in the Adirondacks, shedding

its seed after the fall of the foliage of its broad-leaved associates, finds on this dry stratum poor chance for germinating and still less chance of reaching the mineral soil with its delicate roots.

Finally, our climate in many sections is not favorable to natural regeneration. We must not forget that the result of the tempered and humid climate of the Pacific Coast, where any method of restocking would be successful, or the example of the equally temperate climate of France, where methods succeed that in Germany are a failure, can not serve as a model for our Eastern States or dry Rocky Mountain sites.

From the experience of the Forest Service with broadcast sowing in the Black Hills—which is as near an imitation of natural regeneration as can be, we may learn the lesson of what to expect.

The sowing of 1905, an exceptionally wet season, were a success, although even then the result was quite uneven; in 1906 the result was poor; in 1907, again good; in 1908, poor; in 1909, unsatisfactory, although apparently weather conditions were favorable. In 1910 the extraordinary drouth of the season caused total failure. Out of five years three failures!

While, in the Eastern States, weather conditions may not be as severe, they are certainly as uncertain, and a successful natural regeneration is largely a matter of luck.

While then still confessing myself an eclectic, willing to employ any method that promises satisfactory results, I have come to the conclusion that Thomas Meehan was not so far wrong for a large part of our territory and conditions. We may try our luck first with natural regeneration, but if not successful at once, instead of tinkering with nature we should, like wise men, force the luck by planting. I wish then to go on record as holding the opinion, that our needs of the future will not be satisfactorily and adequately provided for until we take recourse to planting operations on a large scale.

This conclusion, based on observa-

tion of biological conditions, is also borne out by a statistical inquiry.

Referring again to the forest area condition we will find that, if we go on as at present, within 20 years we will have reached the point when our virgin timber, in which natural regeneration methods might still be practiced, will be near its end, for we are cutting now at the rate of 10 to 12 million acres per annum.

Our needs then must be filled to the largest extent from the so-called second growth and volunteer growth of our cut-over lands, and the area capable of restocking only by artificial means will have increased to probably 250,000,000 acres, over half of the then remaining forest soil. We shall, indeed, be forced to plant, whether we believe in the method or not!

Before now discussing the elements of a plan of procedure it is needful to point out that it is useless to expect private enterprise to undertake the task, at least not without considerable assistance from the State. On account of the long time to maturity—not less than 60 to 100 years—private interest cannot be expected to be keen in engaging in such business, which is profitable only in the long run.

That in the old countries, France and Germany, private forest management has, in part and with many exceptions, been successful, can be explained by historical development and by special economic and political conditions. Among these is the institution of the so-called *Fideikommis*, *i. e.*, trust property—private property placed by some previous owner under State control in order to prevent mismanagement, exploitation or disposal by his successors, under which institution nearly one quarter of the private forest area of Germany is kept in producing condition, besides 30 per cent of the private area which is under State control for other reasons, so that over half of the private forest-area experiences State control.

The other half is very frequently mismanaged, exploited and destroyed, and it is decreased by the State governments buying it up and reforesting. Over one million acres were thus acquired by the

States during the last two decades, Prussia alone having spent some \$25,000,000 in that direction.

It is only long lived corporations, municipalities and governments that can afford and can be expected to carry on a persistent conservative policy and spend money and tie up capital which is not returning interest for many decades. Such large persistent corporations as railroads needing a continuous supply of ties, or those engaged in paper manufacture whose business run with expensive plants is based on continuity of forest supplies may embark successfully on growing their raw material. The small farmer, who does not count his time, may also in a very small manner contribute towards eking out supplies. But in the end, I am afraid, we will have to abandon the democratic dream of individual endeavor and learn the lesson that communal interests must be attended to by the community. In the end, only the State and municipality can be expected to provide for a distant future! There are some foolish notions abroad as regards the distance of that future, the length of time it takes to grow a log tree. We may not go at length into this subject, only stating that with most species in most localities nothing can be expected in less than 60 to 100 years. An adequate plan, then, for supplying the future needs of timber at least must rely upon State activity and upon planting on a large scale.

As I stated at the outset I have no cut and dried plan for setting in motion machinery to execute such planting propositions, except to set every State forester, forestry commission, and every State forestry association thinking on the matter, to make them realize that their business is not only to conserve or secure conservative use of existing resources, but to create new ones, which shall flow when the existing ones are exhausted; to recognize that this is a more serious matter than can be met with the desultory distribution of a few thousand plants to private planters, or the haphazard planting of a few acres; that it requires *systematic procedure on a large scale*.

Each State forester should make a

canvass of his State as to the acreage which should be replanted, classifying it as to which may be confidently left to private enterprise; which to municipal concern; which to direct State enterprise; which to be taken in hand at once; which to be left to future work.

He should then work out a plan of State co-operation which might take the form in the case of municipalities, besides furnishing plant, material and advice, of pledging the State's superior credit for raising the necessary funds by bond issues for acquiring and reforesting waste lands and in return securing supervisory power for the State.

For New England, municipal enterprise is perhaps the best and most promising, although in general direct State control may be preferable.

An example may illustrate the method of procedure.

Let us assume that a town has borrowed 5,000 acres of waste lands, which it could secure for say \$15,000, borrowing the money from the State at 3%; the 5,000 acres to be planted in a 25 year campaign; that is at the rate of 200 acres per year, at a cost of \$8 per acre; the annual outlay of \$1,600 also to be furnished by the State from year to year, when the interest charges will be \$450 on the original investment and a series of interest payments of \$48, increasing annually by \$48. The loans will then, in the 25th year, have accumulated to \$55,000 and the interest accumulations to \$26,870, or \$1,075 average per year, and the highest last annual charge, \$1,650, amounts not difficult to raise! After the planting is finished the annual interest charge remains stable at \$1,650. Now each year 200 acres may be thinned and every five years the thinning repeated. A net result of \$2 per acre for the first thinning (at that time wood prices will be higher!) \$3 for the second, and \$3.50 for every subsequent thinning, would be a reasonable assumption. In other words, for the next five years after loans and planting have been completed the interest charges are met to the extent of \$400, in the second quinquennium, to the extent of \$700, and in the third quinquennium a surplus begins to appear. Now, arrangements for refunding the

loan may be made at once, or else merely interest may be continued to be paid out of returns for thinnings, the town receiving small incomes until the sixtieth year, when the first 200 acres may come to harvest yielding not less than \$120,000, likely much more at that time, wiping out the loan and leaving a property worth several million dollars producing annual revenue.

And all the State has done is to loan its credit, not one cent is given in charity, and the town has made no expenditure except for the care of the property.

That these calculations are not chimerical may be learned from the experiences in France.

Here the State reforested during last century 200,000 acres of sand dunes at a cost of \$2,000,000. Of this 75,000 acres were sold reimbursing the total cost of the 200,000 acres and \$140,000 to boot, and leaving a property now valued at \$10,000,000.

In the Landes, the State, municipalities and private owners planted nearly 1,750,000 acres at a cost of \$10,000,000, the value of the recovered properties being now placed at \$100,000,000 based on their annual production.

Some 200,000 acres of poor land, unhealthy, useless waste in La Sologne was planted up by a private association at a cost of \$5 per acre. These lands, which 50 years ago could not be sold at \$4 an acre, now bring over \$3 annual revenue, being valued at \$18,000,000.

Another 200,000 acre tract in Champagne on arid limestone wastes, largely planted by private incentive, costing somewhat less than \$25 to plant, is valued at \$10,000,000, furnishing a net revenue of \$2 per acre.

These are results actually achieved and not fancies or forecasts.

According to the Conservation Commission's report there are in New England 2,225,000 acres immediately ready for planting, and with a little closer scrutiny by the State Foresters, probably twice that amount may be found, for I believe I know that Massachusetts alone contains approximately the whole amount stated by the Commission. A twenty-five year campaign of reforestation would necessitate an annual plant-

ing of 200,000 acres. There is some planting done, but in the face of these figures does not what is actually done toward recovery of this lost ground look amateurish and inadequate?

Such an area of 5,000,000 acres, which is twice the forest area of Bavaria and Baden combined, producing \$10,-000,000 annual revenue, planted with White Pine at \$10 per acre and properly managed would eventually produce annually its 2,000,000 M feet of lumber, which even at present stumpage prices would be worth \$20,000,000, and be an ample supply for any population that might be then located in New England.

The same method of engaging the State's credit to inaugurate a plan of preparing for the future and making waste lands productive by municipal planting could be readily extended to the Federal Government assisting the States by loans, if not subventions.

We are now accustomed to have the general Government stand behind large national undertakings, such as the reclamation service, the waterways commission, the good roads movement, etc. If it is desirable for the general Government to spend funds in preparing ground for agricultural use by irrigation works or by draining swamps, why should it not extend its beneficent action to bring waste lands into forest use by inaugurating a systematic financial assistance in loaning its credit to the States for the recuperation of mismanaged forest acres.

It would not be difficult now to elaborate the details of such a plan of co-operation between the general Government, the States and municipalities, and, under special conditions, including private owners of forest land in need of recuperation. If this were done now, by the time our virgin supplies, and second or volunteer growth supplies are used up, plantations would have matured and we would be able to supply our annual needs.

The task and the expenditure would by no means be enormous as the following suppositious calculations may show.

We may assume that some plantations now made for the purpose of lumber

supply will at best mature when sixty years old, although for most eighty years will be needed. By that time, say 1970, we may fairly assume that not only the total supply of virgin lumber will be consumed, but also the second growth of the cut-over lands, and the population, if we assume an average of fifteen per cent per decade—it has been nearer twenty-five per cent during the last three decades—will be 225,000,000. We may also assume that by the time—indeed long before, for otherwise supplies would not last so long—our consumption of log wood material will have come down to at least the present minimum of Great Britain's consumption, namely, twelve cubic feet or 100 lumber feet per capita.

This would require the cut of first-class forest growing at the rate of about four hundred feet B. M. for sixty years close to 1,000,000 acres per year, hence to secure a continuous supply 60,000,000 acres must be in that producing condition. The probability is that not less than 100,000,000 acres in part under natural regeneration would have to be maintained to satisfy all needs for wood materials.

We have seen that less than \$20 per acre would be required for planting cost and interest account, and hence an annual loan of \$20,000,000 for sixty years—two dreadnoughts a year—would be a most ample provision.

Summarizing, then, the elements of my plans are:

(1) Each State to ascertain its quota of planting area, classified for systematic procedure in its recovery.

(2) A co-operative financial arrangement, by which municipalities may secure the credit of the State and States the credit of the Federal Government for the purpose of acquiring and recovering their quota.

(3) State planting to be done on a large scale.

If I have not developed a very definite and adequate plan to meet our need for wood and timber in the future, I hope I have at least opened up a line of thought which may lead to its formulation.

GAS IN TREE CAVITIES

By WM. P. PHILLIPS, *University of Texas*

I CAN add some interesting personal observations in reference to the article entitled "Gas Contained in Trees," in the June number of AMERICAN FORESTRY.

Some time ago I was examining some lands along the Navasota river, Brazos county, Texas, about sixteen miles east of the town of Bryan. A gentleman residing in the neighborhood asked me one evening if I had ever heard of a combustible gas coming from a tree, and I replied that I had not. He then said that two negroes who were hunting for 'coons and 'possums in a swamp near his house had "treed a varmint" and had cut the tree down, a good-sized black gum, and that when they flashed the torch into the opening a long gas flame sprang out. Whereupon the two hunters took to their heels and left the "varmint" to his own devices.

The next day we went to the place and I found the stump, as described. It was about four feet high and the center was hollow, the hollow portion extending to the ground. There was some water in the stump and bubbles

of gas were escaping through it. I cut a stout pole and ran it down as far as possible into the roots. On withdrawing the pole, the water began to boil violently and I ignited the gas. It burned for several minutes with a bluish flame characteristic of marsh gas and finally the flame went out. I then pushed the pole down into the ground all around the stump and combustible gas came up from each hole. The same thing was observed for some distance around the little pond and along the river. On pushing a pole down into the decomposed vegetable matter combustible gas came up and was easily ignited.

I suppose that gas often accumulates in hollow trees, especially such as grow in or around swamps and whose wood is dense enough to act as chambers for the gas. The reason why we do not often observe it is that it escapes through knot holes and through the walls of the chambers themselves. So far as known it is marsh gas, as Professor Bushong has already noticed in the case of gas from a cottonwood tree.

COMING MEETINGS

September 24-27—Meeting of the Pacific Coast Logging Congress at Spokane, Wash. G. M. Cornwall, Portland, Ore., secretary.

November 18-20—Fifth National Conservation Congress, Washington, D. C.

SEEDLINGS FOR FARMERS.

The Canadian government has supplied twenty-five million tree seedlings to farmers, principally in the Alberta and Regina plains region. The United States does not supply young trees to the public, except in a limited area in Nebraska under the terms of the Kincaid Act.

FORESTRY IN CHINA.

The new Chinese republic has established a department of agriculture and forestry. For a long time China had been pointed out as the most backward nation in forest work.

CORK OAK, AN EXOTIC WITH COMMERCIAL POSSIBILITIES

BY GEO. DE S. CANAVARRO

FEW products of nature have had as ancient a history or as wide uses as cork. Theophrastus, Pliny, and other writers of antiquity, were familiar not only with cork but also with the tree producing this valuable product. In fact, many of its present-day uses were well known and appreciated by the Greeks and Romans centuries ago.

The advent of the glass bottle in the 17th century gave great impetus to the exploitation of cork and from this period the cork industry began to assume noticeable and, as time progressed, ever increasing proportions. Nor has the intelligence of advancing civilization, prone to substitution whenever economy and efficiency can thus be obtained, discovered anything in nature or through synthetic manufacture which fills so satisfactorily the many and diversified uses of this material. It remains without a rival, employed increasingly, as new industries develop, in an amazing number of ways.

The Home of Cork Oak.

The cork oak tree, *Quercus suber*, from which the bulk of the world's supply of commercial cork is obtained, is native to the western half of South Europe and to the coast lands of Northwest Africa, or, broadly speaking, between the 34th and 45th parallels of North latitude. This territory embraces not only the Mediterranean coast countries of Tunis, Algeria, Morocco, Spain, Southeastern France, Italy, and Dalmatia, but also the countries bordering on the Atlantic as Portugal, Southwestern France, and Northwestern Morocco. Cork oak is distributed in these countries over an area estimated at about five million acres. The output of crude cork is in the neighborhood of fifty thousand tons a year.

Spain and Portugal produce most of

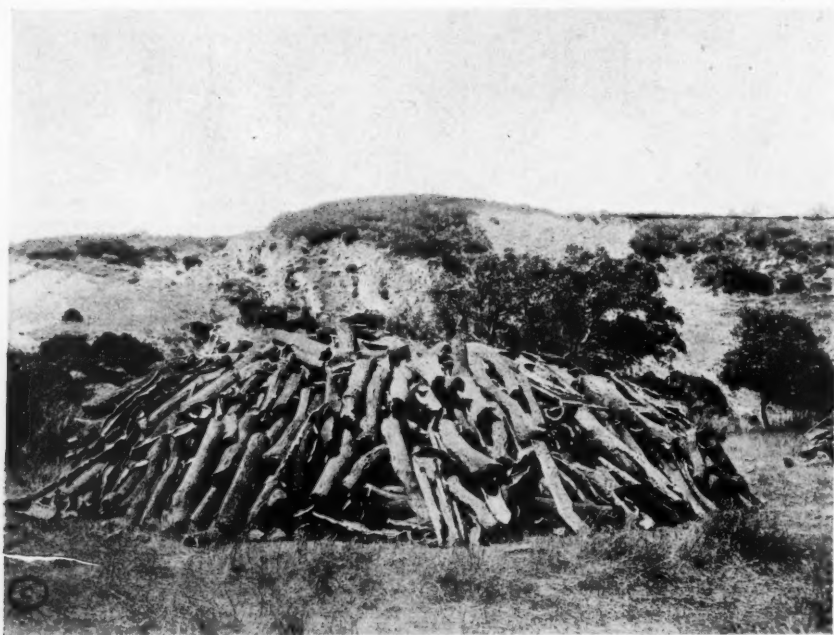
the raw material entering the world's commerce, and for many years the gathering of corkwood, as it is called, and the manufacture of the finished product as well, has constituted one of the chief industries of these countries. Almost all of Portugal possesses cork oak forests, although the heaviest and highest yielding stands occur in the southern districts. The cork oak forests in the Spanish districts of Catalonia, lower Andalusia, and Estremadura are said to be the richest in the world. From them cork of the finest texture and quality is harvested annually in large quantities. After Spain and Portugal, Southern France, Italy, Sicily, Corsica, Algeria, and Tunis rank next in importance as cork-producing countries.

The geographical range of cork oak shows that it is confined to a territory where the thermometer seldom or never falls below 21° F. or mounts above 104° F. Throughout this region it flourishes on warm, sunny hills and mountain slopes at medium altitudes, making its best development in Spain and Portugal at elevations of about 2,000 feet. It is found on soils of wide variation as to texture and composition, from those composed of silicious layers to those derived from granite and flint such as are commonly met with in Catalonia. Sandstone and sandy soils when stiff enough to retain moisture also favor its growth. The tree avoids noticeably, however, heavy clays and impervious, ill-drained soils.

Precipitation is one of the most important factors necessary for the thrifty development of cork oak, and although it occurs in countries where semi-arid conditions prevail locally, it fails to thrive where the annual rainfall is below 20 inches. Abundant soil moisture, an average annual temperature of about 60° F., and a soil of the origin



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A GNARLED OLD VETERAN CORK OAK TREE.



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A LARGE PILE OF CORKWOOD DRYING.

and quality mentioned are requisite for its most rapid growth and for the highest yield of corkwood.

Harvesting Cork.

Cork oak attains an average height of from 30 to 45 feet and an average diameter of from 3 to 4 feet. Unusually large specimens are over sixty feet high and nine feet in diameter. The spreading crown of the mature tree is low and has characteristically twisted branches. The ultimate branches are clothed sparsely with small, evergreen leaves. Bitter, acrid acorns are borne every year and in Spain are fed to hogs whose hams and bacons are said to gain thereby an especially desirable and piquant flavor.

The natural, or virgin, bark is of a light-gray color, rather deeply furrowed. It is first removed when the tree is approximately twenty years old or about five inches in diameter. Al-

though of slight commercial importance, stripping is necessary in order to stimulate the cork-making zone of the inner, or mother, bark, which seems under this treatment to produce subsequently cork of a much higher value. The first crop of commercial corkwood is obtained from trees thirty to forty years old, and a harvest is made thereafter at intervals of from eight to nine years until an age of about 200 years is reached. As the trees are successively cropped the grade of corkwood is much improved. The first crop is worth about thirty cents per tree; the second about sixty cents. At the age of sixty years the crop is worth \$1.40, while the yield of trees between 110 and 120 years old is valued at \$4.90 per tree.

Removing or stripping the bark from the tree is a comparatively simple operation although requiring considerable care and skill in order to prevent injury to the inner bark, which not only performs the function of cork making,

but also sustains the life of the tree. In practice it is the custom to girdle the tree near its base and also at a point where the branches spring. The double girdles are then connected by one or two longitudinal incisions and the bark pried off by inserting in the vertical cuts a specially designed wedge-shaped tool. Large cork-bearing limbs are also frequently decorticated in the same way. When detached from the tree, the bark, or more properly at this time, corkwood, is in the form of hollow cylinders and curved slabs, and is stacked and allowed to dry for a few weeks. After drying it is boiled, a process which not only flattens out the cylinders but also removes the valuable tannin in which the bark is uncommonly rich. The rough, weather-beaten, exterior surfaces are then scraped of superfluous woody ridges and the bark is ready for shipment to cork manufacturing and exporting centers. At these points expert graders trim out defects and sort the raw bark into a hundred or more

grades. In bales of four or five hundredweight it then enters the world's cork markets for manufacture into the thousand cork necessities of life.

Cork Oak in the United States.

Growing cork oak in the United States has been considered with favor for many years and as a commercial proposition it is not without promise. As early as 1858 and from time to time during subsequent years, the Department of Agriculture attempted to introduce the tree, and to this end procured acorns from abroad and distributed them to various persons residing in the Southern States and in California. The results were not generally gratifying, probably because of inferior acorns, which are notoriously of poor keeping qualities, and a lack of knowledge or interest on the part of the individuals entrusted with their planting. A few trees are to be met with occasionally, however, and several fine specimens, particularly in California, bear evidence that under favorable conditions



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THE PROCESS OF STRIPPING CORK OAK TREES IN SPAIN.



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SORTING ROOM, ARMSTRONG CORK CO.

the tree will flourish in certain sections of the country. Parts of California, Florida, and portions of the Gulf States possess climate and soil which seem to meet in general the requirements of cork oak. But although the tree has a wide potential range in the United States, it has not yet been ascertained by complete and satisfactory experiments what localities are unquestionably suited to it, nor equally important, what cultural practices are best adapted to its peculiarities. In Europe successful plantations have been established by sowing acorns, selected from heavy cork yielding trees, either in vineyards between the vines or in plowed fur-

rows on untilled ground. But little care is given the young trees raised in the second manner other than protection from fire and occasional light cultivation to keep down choking weed growth. When the trees reach a sufficient size land planted to cork oak is often utilized for grazing purposes and for raising annual crops such as wheat or barley.

For the last three years the Forest Service, in co-operation with the Bureau of Plant Industry, has been carrying on planting experiments in California and Florida. One of the chief obstacles to success thus far is the fact that fresh, viable acorns are difficult

to obtain. Untimely frosts and droughts during the young and tender stages of the seedlings have also caused a large proportion of losses so that further efforts will be necessary before conclusive results may be expected.

From a commercial point of view, especially from that suspicious angle from which the private individual ordinarily contemplates commercial forestry, growing cork oak has one more or less serious drawback, namely, the length of time involved before dividends can be expected from the investment. Although twenty-five to thirty-five years is admittedly a long time to wait for returns, compensating advantages are to be had in growing this tree offered by few other forest investments. Where the climate and soil are favorable, unproductive lands either too broken, rocky, or steep for agricultural purposes may be planted with cork oak, and, it would seem, with a fair assurance of profit. Plantations of cork oak

once successfully established differ from most tree plantations in that they require but little provision for a future stand of trees, since the trees are never cut and may be carefully decorticated for many years without danger of loss. Moreover, outside of the initial investment in planting, protection, and care of the young trees for two or three years afterwards, little or no expense is necessary to bring the plantation to bearing.

With an increasing import business in cork amounting now to almost \$5,000,000 a year, and with the demand constantly growing it seems reasonable that, having once settled some of the questions relating to the methods of establishing plantations, we should receive a measure of this trade by producing home-grown cork and at the same time lay the foundation of a flourishing industry, perhaps eventually of sufficient magnitude to supply entirely our domestic needs.

FIRE LINE LAW UNCONSTITUTIONAL

ON June 18 the New Jersey Court of Errors and Appeals, the State's highest tribunal, decided that the law passed in 1909, commonly known as the Railroad Fire Line Law, was unconstitutional upon the ground that "it contravenes Article I, Section 16, of the Constitution which declares 'private property shall not be taken for public use without just compensation.'"

The decision is unfortunate because since the law was enacted, and largely since its constitutionality was questioned, the larger railroads of the State have voluntarily continued making fire lines as prescribed in the statute with the co-operation of the property owners. Though the last year's construction has not been fully recorded, the State has approximately 350 miles of fire-line out of about 900 miles, which is the estimated exposure.

The reason for this voluntary action, and the justification for the law are found in the fact that the forest fires set

by the railroads are restricted more and more to the areas unprotected by fire lines, and that not less than 90 per cent of the fires started, big and little, occurred where there are no fire lines.

The Forest Park Reservation Commission is now striving to find some means of meeting the situation that this decision presents, for, of course, the fight against forest fires must go on, and equally, of course, some measure of protection must be found for property owners who are so unfortunate as to be located in the neighborhood of railroads which do not want to maintain fire lines.

It may be observed in passing that all of the States' railroads are striving to solve this problem because of the many claims for damages that are presented. It is thus not a question of imposing burdens upon the railroads, but rather an effort to find a means of saving forest property at the lowest cost all around.

THE FARMER'S DECALOGUE

The Forest Service has devised this decalogue for the use of farmers in the plains regions, to direct their use of windbreaks.

I. Place the windbreak at right angles to the direction of injurious prevailing winds.

II. Devote from one-eighth to one-fifth of the farm to timber. Its protective value more than pays for the ground it occupies, to say nothing of the timber yield.

III. Plant only species suited to windbreak use, to the region and to the locality.

IV. Plant rapid growers for quick results; but underplant with slower growing species, which are usually longer lived and more valuable.

V. Supplement a deciduous windbreak with evergreens to afford protection in winter.

VI. Separate trees by the spacing proper to the species used. The trees should be close enough to produce a dense windbreak and to yield good poles, but should not be so crowded as to produce spindling growth.

VII. Make the windbreak thick from the bottom up, especially on the side toward the wind. This may be done by using species which branch near the ground, by planting outside rows of low-growing trees, by encouraging natural reproduction, and by underplanting.

VIII. Cultivate the plantation thoroughly while it is young.

IX. Do not allow excessive grazing where reproduction is desired.

X. Do not thin your woodlot too heavily or take out the best trees for minor uses. Remember that a timber tract should be improved by use and that each clearing should leave it in better condition than before.

THE NATIONAL CONSERVATION CONGRESS

SO very important is the Fifth National Conservation Congress, in Washington, D. C., on November 18, 19 and 20, to be to the forestry and lumbering interests of this country, that the directors of the American Forestry Association, in session at Lake Sunapee, N. H., on July 23, decided to hold an annual convention of the Association in Washington during the period the Congress is in session.

There will then be present, it is expected, the largest gathering of forestry and lumbering experts that has ever been held in the United States or Canada. Every State is to be represented, and there will be a number of matters of the greatest importance to the different interests.

One of the features of the gathering will be a big forestry and lumbering dinner to be given under the auspices of the American Forestry Association, and this affair alone, it is expected, will bring several hundred foresters and lumbermen here. Members of the Association who desire reservations made for this dinner are requested to inform the Secretary as soon as possible.

Ten sub-committees appointed by the forestry committee of the National Conservation Congress are now at work investigating subjects of the greatest importance to lumbermen and foresters and several of these committees will be in readiness to make definite reports when the Congress is in session. The work of these committees is being financed by the American Forestry Association which has secured an appropriation of \$5,000 for that purpose.

President Charles Lathrop Pack of the Conservation Congress outlined his views of what the Congress is to be in his address at the forestry conference at Lake Sunapee in July, which, owing to his illness, was read by his representative, Mr. Norman C. McCloud.

Mr. Pack said:

"There is no doubt that in our minds conservation of the forest means not the reservation our enemies would teach, but the best use of the woodlands we have. It is a great problem which you and I are bound to work out—fight out if necessary. The care and cultivation of forest and field is work that furnishes a test of our American citizenship and as important as these things are in themselves, the real problem, my forestry friends, is the cultivation and conservation of men. With better-cared-for forests and agricultural lands we will have better men and women to use them.

"The Fifth National Conservation Congress meets in Washington, D. C., November 18, 19, 20. It is to be your Congress this year in a peculiar degree. For several years at the annual sessions the Conservation Congress has given much time to the important subjects relating to human life, to soils, to the evils of the many forms of economic waste. This year in Washington we come back to the meeting-place of the first great national conservation assembly, and some of us now here took part. I refer to the gathering of the Governors of all the States at the White House in 1908. It is also most fitting that this year we return to the consideration of forestry and water-power—the subjects with which the conservation movement started. No man who calls himself a forester, no State or association forest or conservation official, no forestry school educator, no up-to-date lumberman, can afford to be absent. It is this year to be your meeting. It will be what you all make it. I am glad to say that all signs point to a very large attendance. The work of the Forestry Committee with its subdivisions financed through the American Forestry Association, under the leadership of a New England man, is progressing in an admirable way, hopeful of large

results. Some of the reports, I am told, of these investigators from New Hampshire to Oregon, will be ready for the printer in September. The Water-power Committee is also a strong one, and I feel sure that its work will inspire your consideration. There will be other features of the Fifth National Conservation Congress, but the subjects relating to forestry and water-power will be given the greatest prominence this year. I promise to persist at my part of the labor before us, and I feel that I can rely upon every one of you. Let us all meet there in Washington and let us all *push*. That reminds me of the story of the Georgia negro couple I once knew who had grown rather tired of each other. After a quarrel with his wife, Rastus finally decided to commit suicide by hanging himself because he thought Manda no longer cared for him. One evening he piled the two family washtubs on top of each other bottom up—stood on the top tub and fastened the clothes line over the cabin rafter, slipped the rope noose about his own neck, and then kicked the wash-tubs over. As they went out from under him, Manda saw Rastus' eyes begin to look glassy, with a peculiar roll, and with a scream she rushed to his aid and began to pull down as hard as she could. Rastus was just able to gasp, "Don't pull, Manda; don't pull—*push! push! push!*"

"Who will push for us if we don't push for ourselves? Who will believe in our works and in us if we can't show our faith in each other and in our common conservation cause? When you come to Washington, be a good fellow. Expect to find what you will, but don't forget that someone expects something of you.

"In transporting fruits for the Eastern markets from the Pacific Coast, the first consideration is that there should be *coldness*, and then isolation. The delicate fruits must not touch each other. You know some people who go through life like that, and what a mistake it is. There is no one whose horizon can not be widened, whose vision will not be further and better if he will only take advantage of the wholesome education of fellowship. There is no better fellowship, no better companionship, than that which can be furnished by educated foresters. I deem that man or woman fortunate who has such a scientific nature-lover as a friend."

Come to Washington in November and see your old friends and make new ones. We need the personal aid of every one of you in the work of the Fifth National Conservation Congress.

Who shall say that it may not be the people's great Conservation Congress? Who shall say that it may not be the people's great conservation fight?"
Come, Push.

EUCALYPTUS TOOL HANDLES

THE Eucalyptus Hardwood Association of California met at a luncheon in Los Angeles on July 2, and listened to an interesting talk on utilization of Eucalyptus for tool handles. Mr. C. H. Mason, General Manager of the Oxnard Eucalyptus Mills, was the speaker. He showed the members samples of tool

handles made of California-grown Eucalyptus lumber, and said that such handles were giving fine satisfaction and were considered equal to the best second-growth hickory. It was pointed out that, with the growing scarcity of hickory and other strong, tough woods, California's hardwood, Eucalyptus, will soon be in great demand.

HALF OF CANADA FOR TIMBER

According to the Canadian Forestry Association 50 per cent of Canada is capable of growing nothing but timber crops.

FOREST CONDITIONS IN KENTUCKY AND TENNESSEE

Prepared in the Forest Service by R. CLIFFORD HALL

THE STATES' FOREST WEALTH.

WHOEVER would write a history of a hardwood lumber industry up to the present time must lay one of his principal scenes in Kentucky and Tennessee. For these two States have furnished the nation with an immense amount of hardwood timber, and are still an important source of supply. They send to the market annually more than 3,000,000,000 board feet. In 1909, the year for which statistics are most complete, nearly 5,000 sawmills were operated within their borders, with an annual product valued then at over \$46,000,000. The capital invested in logging and milling plants amounts to more than \$28,000,000.

But the results of past lumbering in Kentucky and Tennessee have been only too much like those which have followed most lumbering operations elsewhere in the East, and partly through heavy culling of the best species, partly through surface fires, and to some extent through grazing, the forests of the two States, once among the richest in America, are now considerably impoverished. The present annual cut amounts to several times the present annual growth. In most places the best white oak, chestnut, yellow poplar, red gum, beech, hickory, ash, basswood, elm, and maple have been culled out, and except in the more inaccessible parts of the mountains virgin forests are rare. Private owners are doing little to insure a future stand of commercial timber on their holdings, and in both Kentucky and Tennessee there is the need and the opportunity for organized State effort to bring about better use and better protection of the immensely valuable forest resources which have played such a large part in the States' development.

The figures in the first paragraph give some idea of just how valuable these resources are. They bring wealth to the State and employment to thousands of persons. They do more than this, however, for they make it possible to utilize land unfit for anything but timber, and they protect the headwaters of important navigable streams which carry the commerce of a vast region.

THE PRESENT FORESTS.

An estimate completed in 1909 by the Forest Service, in co-operation with the Kentucky Board of Agriculture, showed the total amount of standing timber in that State (in trees 12 inches and over in diameter breasthigh) to be 22,955,000,000 board feet. Of this amount 5,000,000,000 feet was white oak, a little over 4,000,000,000 feet was black oak, and nearly 3,000,000,000 feet chestnut oak. Beech and chestnut each amounted to between two and three billion, and poplar, hickory, and maple each to between one and two billion feet. No such detailed figures have been obtained for Tennessee, but less complete estimates in 1906 for both States give a slightly higher total in Tennessee than in Kentucky, about corresponding to the slightly larger area of the former State.

Kentucky and Tennessee, considered as a single unit, may be divided into five regions: (1) the mountain region, covering the Allegheny and Cumberland plateaus and the Appalachian Mountains in Tennessee; (2) the central highland region, comprising the rolling country encircling the Nashville Basin and extending westward to the Tennessee River; (3) the Nashville Basin region; (4) the blue grass region, and (5) the Mississippi Valley region. In this description the Nashville Basin and the blue grass regions are considered as one.

It is the mountain region, comprising



RAILROAD BRIDGE OVER NOLICHUCKY RIVER, TENNESSEE, BEFORE THE FLOOD OF MAY, 1901.

some 28,300 square miles, which is the most heavily forested and best suited to the production of timber. Though Eastern Kentucky is in reality a broad, high plateau, cut by deep valleys and ravines, with true mountains only in the southwest corner, the Unaka and Great Smoky Mountains, along the eastern border of Tennessee, reach the highest elevations of the entire Appalachian region. Within the mountains of the two States are the headwaters of the Big Sandy and Licking Rivers, draining northeastern Kentucky; the Kentucky River, draining east central Kentucky; the Cumberland, which drains a large part of the plateau region in southern Kentucky and northern Tennessee, and the Tennessee River, with many tributaries rising in the Appalachian belt and the southern part of the Cumberland Plateau. Over much of the mountain region the steepness of the slopes or else the sterility of the soil makes agriculture impossible, though this is not true of many of the coves,

much of the lower slopes, and large areas in the Tennessee Valley. As a whole, however, the mountains are a forest region, and their greatest value lies in the production of timber and as a source of streamflow.

In both Tennessee and Kentucky the timber of the mountain region runs about 3,300 board feet to the acre. The chief commercial trees are white oak, yellow poplar, chestnut, chestnut oak, red oak, and hickory. Shortleaf pine and hemlock are the most important conifers, but white pine and spruce occur here and there. Repeated culling has resulted in a mixed stand of trees of all ages and sizes. Even-aged stands are confined to abandoned clearings, and, as in the northern counties of Kentucky, to land which has been cut clear for charcoal. The best timber is found in the coves and on lower north slopes, where the dominant tree is usually yellow poplar, though sometimes white oak, red oak, chestnut, white pine, or hemlock may assume the chief place. Be-

sides these are beech, sugar maple, black oak, birch, basswood, hickory, buckeye, ash, elm, walnut, and cherry. The typical virgin stand is dense and tall, and runs 10,000 board feet, and sometimes as much as 20,000 to 35,000 board feet to the acre. The most valuable species, including yellow poplar, walnut, ash, and white pine, are intolerant of shade and will not reproduce in the small openings left where only the most valuable timber has been taken out. Yellow poplar holds its own by taking possession of the larger clearings and old fields. Oak and chestnut, too, find it difficult to reproduce in the small openings in competition with the more tolerant beech, maple, and hemlock. Where logging is done by railroad the stand is cut heavily, but often there are not enough seed trees of the right kind left standing to ensure the most valuable young growth.

On south slopes, on north slopes above the coves, and on the narrow ridges of the Unaka Mountains and of the more dissected portions of the pla-

teaus the stand is composed mainly of chestnut, oaks, and hickories, running in virgin stands between 5,000 and 6,000 board feet to the acre. Beech, cherry, basswood, and buckeye are prominent on north and east slopes. The scrub and shortleaf pines of lower elevations are replaced by pitch pine on the more exposed situations. Spruce begins to appear at altitudes as low as 4,000 feet, but is best developed above 5,000 feet, where it grows with beech, yellow birch, maple, and at the highest elevations with balsam. Below 2,500 feet in the Appalachians and throughout the plateau region the chief trees are chestnut, chestnut oak, black, scarlet, and white oak, and hickory. Reproduction at the lower altitudes, both from seed and from sprouts, is good.

The flat ridge tops of the Cumberland Plateau in both States support a typical tableland forest. While on the better soils the timber is of fair quality, on the sandy soils it is short and limby. Repeated fires add to the naturally unfavorable conditions. Even in virgin



ALL THAT WAS LEFT OF THE BRIDGE AFTER THE FLOOD.



SILT BARS DEPOSITED IN THE CHANNEL OF THE TENNESSEE RIVER.

The silt is washed from the deforested slopes into the river and must be dredged out at great expense.

timber the stand per acre averages only between 2,000 and 3,000 feet. On the better soils the principal trees are black, white, Spanish, and scarlet oaks, hickory, chestnut, and shortleaf pine; on the sandy ridges, post, black, scarlet, and chestnut oaks, pale leaf hickory, black gum, and scrub, shortleaf, and pitch pines.

The forests of the central highland region are made up of woodlots and small timber tracts on the steeper slopes and ridges and on the overflow lands along the larger streams. In both Kentucky and Tennessee they cover about 32 per cent of the region's total area, and average about 1,400 board feet to the acre. The principal trees are oaks, yellow poplar, beech, chestnut, hickory, and red gum. Virgin timber is confined to a few small bodies in the more inaccessible parts of the region. Elsewhere the stands have been heavily culled, and are now irregular and poorly stocked. In the iron country of Tennessee and southern Kentucky much of the woodland has been cut clear for charcoal, and even-aged stands have come up.

In the blue-grass and Nashville Basin regions the forest is confined largely to small ornamental groves and to belts and patches of timber on the hillsides and along river bluffs. In Kentucky about 10 per cent of the area is wooded, and in Tennessee perhaps a little more. Besides the oaks, the principal trees are hard maple, beech, ash, walnut, and hickory. Red cedar is fairly plentiful in the Nashville Basin, though comparatively rare in the Kentucky blue grass.

The forests of the Mississippi Valley region are either those typical of the bottomlands along the Mississippi, Ohio, and Tennessee Rivers, with red gum, cottonwood, oaks, ash, cypress, elm, sycamore, hickory, and tupelo, or else upland stands composed of oaks, hickories, and some shortleaf pine. The bottomland forests average 5,000 board feet to the acre; the upland forests much less. The largest bodies of mature bottomland timber are found along the Mississippi from the mouth of the Big Hatchie River, in Tennessee, to Hickman, Kentucky. Such stands, however, can not be considered permanent,

since most of the bottomlands will eventually be reclaimed for agriculture.

LAND OWNERSHIP.

The mountain forests are owned either in holdings of 100 to 250 acres by farmers, or else in large tracts by outside lumber companies. In the central highland region the land, except for a few large mineral and timber holdings, is owned by farmers in tracts of from 80 to 300 acres. In the blue grass, Nashville Basin, and Mississippi Valley regions practically all the land is divided into small farms.

Mining companies commonly dispose of the timber on their land to lumbermen, and farmers often lease to corporations mineral rights over large areas, with the privilege of cutting timber for mining purposes. It is this divided ownership which is one of the chief stumbling blocks in the way

of better forest management in Kentucky and Tennessee. Too often the owner of timber has no interest in the land, and cares not at all whether he leaves it in good shape or bad. Few timber owners intend to cut again on the same land, so little or nothing is done to ensure reproduction or protection from fire. Most of the land which has been cut over in the past will require improvement extending over many years before it is again restored to something like its full productive capacity.

FOREST PRODUCTS.

Forest products of the mountain region of Kentucky and Tennessee include practically all that are commonly obtained from hardwood timber. There is lumber of every kind, from clear, broad panel stock of yellow poplar and quarter-sawn white oak, now obtained only in the more inaccessible situations,



A "CHAMPION" WHITE OAK, 105 FEET HIGH AND 34 INCHES IN DIAMETER, WHICH PRODUCED 14 CUTS AND 150 BOLTS.

There is great waste in converting white oak into cooperage stock.

to rough grades of oak, hemlock, and pine used for general construction purposes and for car stock. Among the hewed products are crossties, practically all of white oak, squared white oak timbers for the export trade, and fence posts for local use. Chestnut poles are an important product, especially in the western part of the Cumberlandlands. Tight staves and heading are made principally in the plateau country where white oak is abundant. Here, also, spokes and other vehicle stuff of hickory and white oak are extensively manufactured. The bark of hemlock and chestnut oak and the wood of chestnut furnish tannic acid. The coal operators draw upon the forests for props, mine-ties, and construction timbers, chiefly of chestnut and oak. Even dogwood and persimmon command a price for manufacture into shuttle blocks.

Eight or ten companies operate large sawmills in the mountains, getting out the timber by means of logging railroads which penetrate into the highest and roughest sections. Portable mills are engaged in clearing up the smaller bodies of timber in more isolated districts. Other timber is rafted from the mountains to railroad points lower down on the rivers, where it is sawed up by large mills. Rafting is practicable only when about one-fifth of the logs consist of lightweight trees, such as poplar, basswood, and buckeye. In all places where the cost of transportation is high, beech, maple, and sycamore are not ordinarily classed as merchantable.

A large proportion of logging operations in the central highland region is carried on by sawmills, many of them portable, cutting from 50,000 to 400,000 board feet a year. In addition to ordinary lumber for local use, the mills manufacture a great deal of dimension stuff for car and wagon stock. White oak and post oak crossties, more than three-fourths of them hewed, are an important product of the region. The trade in sawlogs cut for the large city mills and for veneer centers in the Green and Cumberland River country.

Among the minor products, slack cooperage is one of the most important. A great deal of hickory is also used for buggy spokes and handles. In the mining region small sizes and the poorer grades of timber are used for mine props, ties, and general construction lumber.

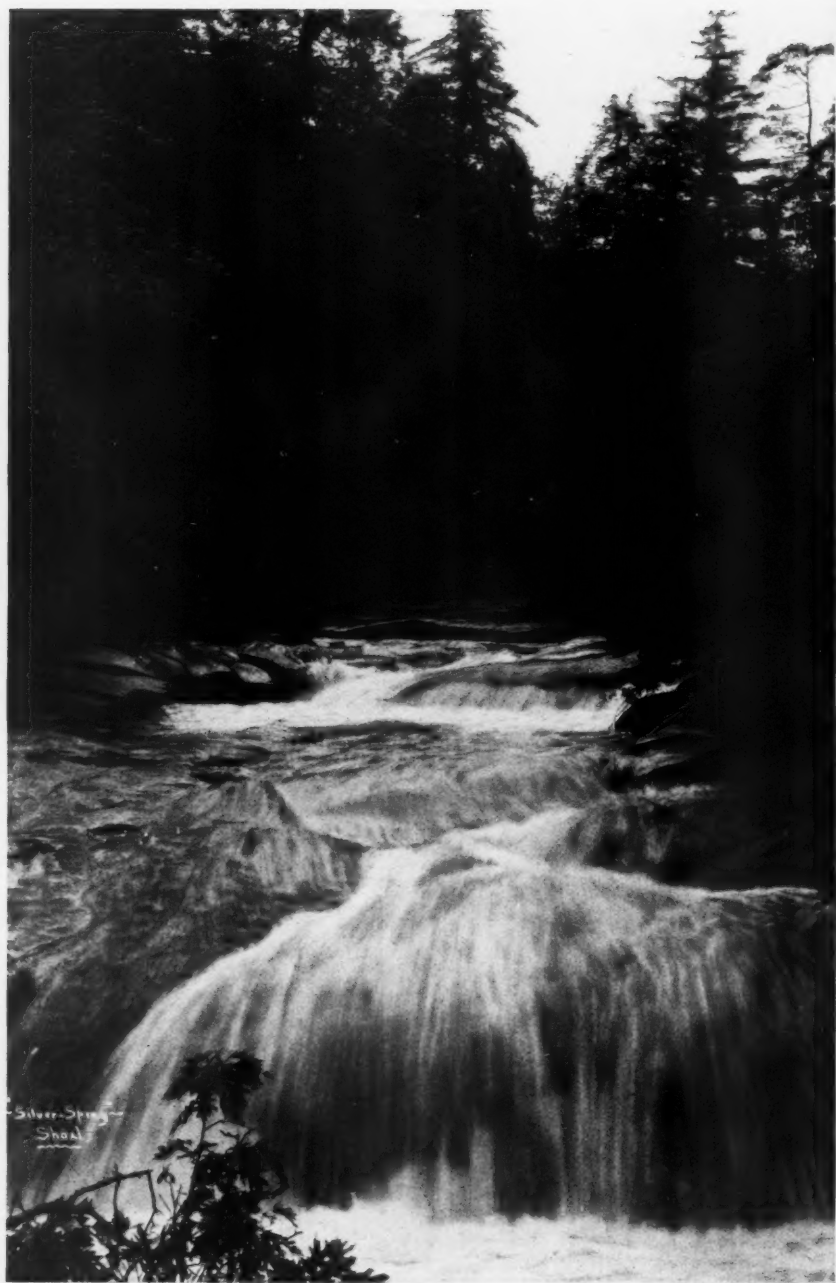
Lumbering in the blue grass, Nashville Basin, and Mississippi River region is of minor importance; the chief industry is agriculture. A few select sawlogs are shipped from various points, principally to the veneer factories and sawmills of Louisville, Nashville, and other cities. A number of large mills along the banks of the Kentucky and Ohio Rivers saw logs that have been rafted down from the mountains. The red cedar industry centers at Murfreesboro, Tenn., where there is a pencil wood factory.

FIRES AND GRAZING.

The first step in the better management of timberlands in Kentucky and Tennessee is to protect them from fire. It is in the mountains, where there is most need for protection, that public sentiment in regard to forest fires is most lax. The owner of timber rights, once he has cut over a tract, cares very little whether fire subsequently runs over the ground or not. The practice of burning grassland to improve the forage is a common one, and has resulted in immense damage to forest growth in the past. If it actually resulted in permanent improvement of forage there might be some justification for it, but as a matter of fact, burning over the range simply results in the substitution of inferior forage plants for the better kinds. Organized State action which will enlist the co-operation of the mining and timber interests is essential if the forest resources of Kentucky and Tennessee are to remain a permanent source of wealth. By its new forest law, which is discussed in the next chapter, Kentucky is now qualified to receive Federal assistance in fire protection under the provisions of the Weeks Act, which provides for



HOW THE SOIL IN MANY PLACES IN KENTUCKY AND TENNESSEE IS ERODED BY
HEAVY RAINS WHEN THE FOREST COVER IS THINNED OR DESTROYED.



A MOUNTAIN STREAM IN KENTUCKY
One of the many which feed the large rivers.

a plan of co-operation between the Secretary of Agriculture and individual States in protecting from fire the forested watersheds of navigable streams. To receive Federal aid it is necessary for the State itself to make provision for a fire protective system and also an adequate appropriation to carry it out. It would therefore be greatly to the advantage of Tennessee to provide an adequate sum of money for this purpose.

Grazing is injurious to the forests of Kentucky and Tennessee in varying degrees, depending upon how heavily the range is stocked. On areas overstocked with domestic animals the damage from cropping seedlings and trampling them is considerable. With plenty of grass and not too many stock, the damage to tree reproduction is almost negligible. Grazing may even be beneficial by keeping in check the grass and weeds that otherwise would choke the small seedlings. While hogs root up some seedlings and eat many nuts, they repay under certain conditions for this injury by stirring the soil and by devouring forest insects and mice.

FOREST LEGISLATION.

Until 1912 Kentucky had little legislation relating to forests, except certain very brief and general provisions against setting fire to woods, but no fire warden or other system of fire fighting had been developed. The Legislature of 1912, however, enacted a law establishing a State Board of Forestry, providing for a State Forester, regulating the use of fire in fields and forests, and permitting the purchase of land for State Forest Reserves. This is an excellent piece of legislation, but can be strengthened still further in certain particulars. While full authority for the protection of State Forest Reserves is given, there is doubt as to the authority for patrolling private lands in dry seasons. There is no provision which requires railroad companies to patrol their rights of way. The law authorizes the wardens to employ persons to assist in extinguishing fires, but does not require that every able-bodied man available must accept such employment when summoned. Apparently the entire com-

pensation of the fire wardens and their expenses in fighting fire must come from the Forestry Board's appropriation, unless the fiscal courts or boards of county commissioners voluntarily appropriate money for this purpose. Furthermore, the law does not specifically provide that private owners shall not receive compensation for fighting fires on their own land.

The forest legislation of Tennessee has some commendable features. Besides enacting a fire law, the State has provided for certain lines of forest investigation. The legislation has failed in effectiveness, however, because of lack of funds. There has been no appropriation for the expense of fire fighting or prevention. Moreover, no trained forester is employed by the State, the principal investigative work having been done by the State Geologist in co-operation with the United States Forest Service.

FUTURE IMPROVEMENT.

The chief obstacles in the way of better management of woodlands in Kentucky and Tennessee are the danger of forest fires, the lack of markets for low grade timber, and the want of information among farmers and timber owners concerning the possibilities of practical forestry. Forest fires can be prevented. This has been proved conclusively in other States where an effective protective system has been established and where private owners of timberland have co-operated to meet the danger. It takes money, of course, but very little money in proportion to the amount saved by preventing the destruction of valuable timber and the covering of vegetation on the watersheds. The lumber and wood-using industries of Kentucky and Tennessee are among the most important in the two States. If they are not to be permanent, if after a few more years they steadily decline, and finally lose almost all their present importance, it will mean an enormous loss in wealth. It will mean, too, that within the States there will be large areas of unproductive land. Even with the best management, the current annual output of forest prod-



FORESTED SLOPES IN THE MOUNTAIN REGION OF KENTUCKY.

ucts can not be indefinitely maintained, but the severity of the decline can be mitigated and a start made in bringing the forest back to its former productiveness by the inauguration of such simple measures as fire protection and better methods of cutting.

There is very little doubt that the present poor market for low grade material will, as it were, correct itself, since there is not much more high grade stuff left to take out, and the use of low grades must steadily increase.

While most timberland owners in Kentucky and Tennessee give very little thought to better methods of cutting, several owners of large tracts have made a beginning. In Kentucky some of the mining companies in the western coal fields are trying to ensure a permanent supply of mine timbers from their woodlands. One of the largest of these companies, in addition to protecting its natural forest land, has done a good deal of forest planting, using hardy catalpa, black locust, and black walnut on old fields, and walnut and yellow poplar in open places in the woods. A few of the mining companies in Tennessee have also taken steps to conserve their timber supply. Co-operative effort by the different owners of timberland will probably be necessary before any really extensive protective or improvement system can be inaugurated. Co-operative associations working in connection with State officers could bring about efficient fire protection, and so pave the way for continuous production of timber in the mountain forests.

The chief forest problem of the future in the central highland region will be to check the present deterioration of the upland forests and restore the more valuable kinds of trees to the stand. Most of the upland stands have been culled so often that, for the pres-

ent, further removal of ash, walnut, or white oak is not advisable. Next to these trees, black, Spanish, and red oaks, red gum, and hickory should be encouraged. It would not be wise to try to grow large timber except on the best soils. Instead, it will be best to grow props, posts, and tie material. Where the coal mines afford a good market for small material, this should be cut from the less promising trees in the stand, rather than, as now, to split them out of the larger straight-grained trees. The general use of round mine props would prevent a great waste of saw-timber. Forest planting may sometimes be profitable in the central highland region, either to start a new stand or to replace one that has been ruined by heavy logging and repeated fires, or perhaps to utilize old fields and washed lands. On all typical old fields, except those with poorly drained or acid soils, white ash, red oak, and yellow poplar will be found the best trees to plant. On rich, fresh, and moist soil hardy catalpa will do well, and will also furnish a very durable wood. On poor thin soils black locust is the only tree producing durable wood that will thrive.

In the blue grass and Nashville Basin regions the forest work of the future should consist in restocking the many ornamental groves now dying out, and the establishment of productive woodlots as an adjunct of the farm. Because of the relative scarcity of land adapted to tree growing, the need of farm forestry in this region is great, and ordinarily 10 per cent of the average farm should be in woodlot. Getting the farmers to take better care of their present woodlots and to establish groves on farms now without them will solve the problem of a local timber supply.

PALISADES FOREST LANDS.

Arrangements have just been made between the New York State College of Forestry at Syracuse University and the Palisades Interstate Park Commission whereby the College of Forestry will prepare and carry out a plan of management for the 14,000 acres of forest land controlled by the Commission and lying along the Hudson River. The work of getting the forest land into shape will be started about the middle of August by four advanced students under the direction of Professor Frank F. Moon, of the College of Forestry, who was Forester for the former Highlands of the Hudson Forest Reservation.

THE POET OF THE WOODS

FORESTERS and lumbermen can not claim the woods as their special possession. The whole world is turning more and more to the outdoors in search of health and happiness. The literature of the forest has been growing in volume and interest year by year.

But the forester and lumberman see more in the woods than the layman might. The layman sees the trees and

In recent years such a singer has arisen and has been gaining steady recognition until today the name of Douglas Malloch, a young American poet, has become a familiar one to many thousands of the men who range the forests, or fell the trees; and to all to whom the forest appeals he comes as a welcome messenger.

For that reason the announcement of a new book from his pen has more than the interest of a mere "book review" to the reading public, and to the forester and lumberman especially. To the latter a library without his verse is not a forester's or a lumberman's library at all. For in such a library his verse deserves a place of prominence.

The George H. Doran Company, of New York, and the American Lumberman, of Chicago, have just issued jointly a new book of Mr. Malloch's best work. It is entitled "The Woods," and the men from whose ranks Mr. Malloch comes may well be proud of it. It will do much to give the public a better idea of the men in the lumber camps and in the Forest Service. For this Kipling of the woods has put into verse the humor and sentiment of the hayroad and the trail and painted not merely the beauties of Nature but sung the song of the forester and lumberjack as well.

It is hard to quote from a book in which there is so much that is entertaining. To analyze it is equally difficult. Mr. Malloch's philosophy is the philosophy of contentment. That it is a philosophy that appeals to the public is evidenced by the fact that his poem "Today," which appears in permanent form in his new book, is said to be the most widely known bit of current verse now in circulation. It has been printed hundreds of times in American and British publications, for its cheery "Ain't it fine today?" struck a responsive chord in the public heart.

But the thing in Mr. Malloch's new book that will appeal to the lumberman and forester is the vigorous verses de-



DOUGLAS MALLOCH.

the beauties of Nature. The woodsman sees not only the trees but the lumberjack or a ranger whose camp is pitched in the wilderness and who has his special philosophy and humor; and men have longed for a singer who could put not only the woods but the woodsman as well into song.

scriptive of woodwork, verses with the Kipling punch and swing. The humor and romance of the forest are interpreted in the way that will give delight. With lumbermen, foresters, and all who love the forest "The Woods" will constitute a special and personal

message. The cause of conservation and of forestry will also be aided by this volume, for it will quicken public interest in the woods and their preservation. "The Woods" itself is an unusually attractive example of the book-maker's art. The price is \$1.

FOREST CONFERENCE AT LAKE SUNAPEE

No forestry conference held in the White Mountains in past years equalled in interest and practical value the conference at Lake Sunapee, New Hampshire, on July 22, 23 and 24, which was held under the auspices of the Society for the Protection of New Hampshire Forests with the co-operation and assistance of the American Forestry Association, the State Forestry Commission, the Society of North Eastern Foresters, The New Hampshire Timberland Owners Association and others. Gathering at the beautiful lake from all points in the east the foresters—and there were a number of lumbermen and paper trade men also—found awaiting them a program which was most attractive, and speakers of national fame.

The sessions were held in the Soo Nipe Park Yacht Club and were attended by a large number of the cottagers and the hotel guests at the lake, who were deeply interested in the proceedings.

Hon. Frank W. Rollins presided at the opening session and extended a hearty welcome to the many visitors. Dr. Henry S. Drinker, president of the American Forestry Association, in extending the greetings of the national organization, with its many thousand members, spoke of the steady growth of the forestry movement throughout the United States and the outlook for the future.

Dr. B. E. Fernow, of the University of Toronto, Prof. Filibert Roth, of the University of Michigan, and Dr. J. T. Rothrock and S. B. Elliott, of the Pennsylvania Forestry Commission, also greeted the visitors. A poem by Edna Dean Proctor and an excellent address on the wild animals of New Hampshire, illustrated by lantern photographs, by

Ernest Howard Baynes, concluded the first evening's session.

The Conference took up the actual work of the meeting the following day. First was the business meeting of the New Hampshire Society. The reports of the officials showed that commendable progress had been made during the year, and that considerable work had been done on the forest reserves at Lost River and Sunapee Mountain, and on the new reservations in Tamworth and Monadnock Mountain. The membership increased over 300 during the year and is now over 2,000. An effort is to be made to secure a permanent fund of \$100,000 so that the income, with the membership fees, will provide a permanent fund for the work of the Society. Former Governor Frank W. Rollins, of Concord, was elected president, Allen Hollis, of Concord, N. H., was re-elected secretary and George T. Craft, of Bethlehem, treasurer.

Dr. B. E. Fernow spoke at length on a plan adequate to meet our needs for wood and timber and great attention was paid to his remarks. There were also addresses by Prof. Filibert Roth, of the University of Michigan, and Prof. J. W. Toumey, of Yale, on the acquisition and management of State forest lands and a discussion on the same subject in which Dr. J. T. Rothrock, S. B. Elliott, of Pennsylvania; Walter O. Filley, of Connecticut, F. W. Rane, of Massachusetts, and F. E. Besley, of Maryland, participated.

A report on Commercial Forestry as applied to paper making was read by Elwood Wilson, the forester for the Laurentide Paper Company of Canada, and it attracted much attention and comment. Mr. Wilson dwelt at length on the various woods used in paper mak-

ing, told how, owing to the gradual exhaustion of spruce, fir was coming into use, and discussed the probable future for the paper making companies.

In the evening the meeting under the auspices of the American Forestry Association was held with President Dr. Henry S. Drinker presiding. Prof. H. H. Chapman, of Yale, a director of the Association, described the great and wide spread influence of the Association in legislative work; detailed what it had done during the year and spoke of the great value which forestry organizations in the various States attached to the assistance which the American Forestry Association was able to give them in their legislative fights, as well as the Association's activity in enlightening members of the House and Senate in Washington regarding various phases of proposed forestry legislation.

Owing to the illness of Mr. Charles Lathrop Pack, president of the National Conservation Congress, his address, in which he invited all present to attend the Congress in Washington, on Nov. 18, 19 and 20, was read by Norman C. McLoud.

Mr. W. G. Howard, of the New York State Conservation Commission, told of the legal processes by which New York had acquired State forest lands and Wm. L. Hall of the Forest Service read a very interesting paper on the forests of the White Mountains and how they are to be made useful. He said the Forest Service was quite willing to have many cottagers and others living in these forests because they will aid in forest fire protection as well as in the building of roads.

The Thursday morning session was

cancelled and the paper on "The Influence of Forests on Stream Flow," by W. R. Brown, will be printed in the New Hampshire Association's records and in AMERICAN FORESTRY later.

The social features of the session were most enjoyable, the ladies of the yacht club entertaining the visitors at tea on two of the afternoons.

There were also delightful trips up Sunapee Mountain and to Blue Mountain Park which a number of the visitors greatly enjoyed.

Among the members of the American Forestry Association party were: Dr. Henry S. Drinker, the president of the Association, and president of Lehigh University; Dr. B. E. Fernow, of Toronto, Dr. Filibert Roth, of Michigan; Dr. J. T. Rothrock, of Pennsylvania, vice-president of the Association; W. R. Brown, of New Hampshire; Prof. H. H. Chapman, of Connecticut; Chester W. Lyman and C. F. Quincy, of New York; E. A. Sterling, of Pennsylvania, and Capt. J. B. White, of Missouri, directors; P. S. Ridsdale, of Washington, secretary; Robt. W. Higbee, of New York; H. A. Reynolds, of Massachusetts; O. H. Van Norden, of New York; R. W. Dickerson, of Massachusetts; W. H. Bundy, of Massachusetts; members of the Advisory Board of the Association; S. B. Elliott, of the Pennsylvania State Forestry Commission; Norman C. McLoud, of the National Conservation Congress; E. H. Hall, secretary of the Society for the Protection of the Adirondacks; Philip H. Dodge, president of the International Paper Co., of New York; Mrs. C. F. Quincy, and Mrs. Robt. W. Higbee, of New York, and a number of others.

FOREST ENGINEERS GET LARGE CONTRACT.

The James Maclaren Company, Ltd., of Buckingham, Quebec, has awarded the contract to survey and cruise their limits on the Lievre River to Vitale & Rothery, Forest Engineers, 527 Fifth Avenue, New York City.

The Engineers have 30 men in the field at present, and are planning to complete the work in a year and a half. The limits comprise approximately 2,700 square miles in the western part of Quebec Province. A thorough cruise, survey and appraisal will be made, studies compiled of the growing capacity and reproductivity of the tract and other information gathered which will assist in putting the huge property on a scientific basis for management.

It is a sign of the progressive spirit in the Canadian provinces, when such far-sighted, practical and scientific work is put into effect on some of the great timberland holdings.

THE INCIPIENCY OF THE FORESTRY MOVEMENT IN AMERICA

BY ROMEYN B. HOUGH, B.A.

IT was forty years ago this summer when the first successful move was made towards the establishment of a forestry system in America, and a consideration of the conditions existing at that time and the incipency of the movement is now of timely interest.

Since the landing of the Pilgrim Fathers and the commencement of settlement of this country by white man, the ruling maxim had been "Clear away all the forest you can and make ready for agriculture." It was a good one to follow at first and for some generations after. Everyone was actuated by it, and a man's success in promoting the interests of his country seems to have been estimated by the amount of land he "cleared." Had the maxim directed him to clear only the lands most suitable for agriculture we might have had a truly inexhaustible supply of forest left, if properly managed; but man went on with blind indiscriminination, felling the trees only to burn them, or girdling them to meet with slower death. By this course irreparable damage came finally to be wrought, as we have now painful evidence in the bare rocky summits and slopes which were once clad with forest, but on which now not even soil remains to give hope for reforestation.

The course of general forest destruction finally proceeded far enough to meet all demands of agriculture, and too far, but so imbued was the public mind with the blind belief that the guiding maxim, which had guided father and grandfather was still operative, that the destruction went on. A few thinking minds there were that came to appreciate the fact that it should stop; that the forests that were left should be husbanded with due regard for the future.

One of the pioneers to stem the tide

of public sentiment was Dr. Franklin B. Hough, of Lowville, N. Y., but his efforts at first were like the "casting of pearls before swine," so blind was the public to the consequences of its existing operations and so strong the belief that our forests were inexhaustible.

Finally in August, 1873, Dr. Hough prepared a paper entitled "The Duty of Governments in the Preservation of



DR. FRANKLIN B. HOUGH.

Forests," and read it before the American Association for the Advancement of Science, at its meeting in Portland, Me. It may be seen in the published proceedings of the association of that year. Its opening paragraphs, which vividly picture the consequences of deforestation, are as follows:

"The presence of stately ruins in solitary deserts is conclusive proof that great climatic changes have taken place within the period of human history in many Eastern countries, once highly cultivated and densely populated, but now arid wastes.

"Although the records of geology teach that great vicissitudes of climate, from the torrid and humid conditions of the cold period, to those of extreme cold which produced the glaciers of the drift, may have in turn occurred in the same region, we have no reason to believe that any material changes have been brought about, by astronomical or other natural causes, within the historic period. We can not account for the changes that have occurred since these sunburnt and sterile plains, where these traces of man's first civilization are found, were clothed with a luxuriant vegetation, except by ascribing them to the improvident acts of man in destroying the trees and plants which once clothed the surface and sheltered it from the sun and winds. As this shelter was removed the desert approached, gaining new power as its area increased, until it crept over vast regions once populous and fertile, and left only the ruins of former magnificence."

After reviewing the consequences of deforestation the paper dwells at some length on the existing forestal conditions of this country, our land tenure, etc., and the need of laws "to regulate, promote and protect the growth of wood." It suggests various important measures which a State might adopt for the promotion of this end and concludes with the following paragraphs:

"These are questions not limited to a particular State, but interest the nation generally; and I would venture to suggest that this association might properly take measures for bringing to the notice of our several State Governments, and Congress with respect to the territories, the subject of protection to the forests, and their cultivation, regulation and encouragement; and that it appoint a special committee to memorialize the several legislative

bodies upon this subject, and to urge its importance.

"A measure of public utility thus commended to their notice by this association, would doubtless receive respectful attention. Its reasons would be brought up for discussion, and the probabilities of the future, drawn from the history of the past, might be presented before the public in their true light. Such a memorial should embrace the draft of a bill, as the form of a law, which should be carefully considered in its various aspects of public interests and private rights, and as best adapted to secure the benefits desired."

The reading of the paper was followed by a general discussion and the following members were selected as the special committee above referred to: Franklin B. Hough, Lowville, N. Y.; Geo. B. Emerson, Boston, Mass.; Prof. Asa Gray, Cambridge, Mass.; Prof. J. D. Whitney, San Francisco, Cal.; Prof. J. S. Newberry, New York City; Hon. Lewis H. Morgan, Rochester, N. Y.; Col. Charles Whittlesey, Cleveland, Ohio; Prof. William H. Brewer, New Haven, Conn., and Prof. E. W. Hilgard, Ann Arbor, Mich. The committee shortly after convened and the first two mentioned above were appointed a sub-committee to prepare the memorial and to bring the subject first before Congress.

After preparing the memorial and submitting it to the general committee the sub-committee repaired to Washington in January, 1874. There, after conferences with members of Congress and others interested in the subject, it was decided to ask for the appointment of a commission in the interest of forestry, similar to that previously created in the interests of fisheries. This plan was cordially approved by the President and the memorial of the sub-committee was transmitted by him in a special message to Congress on February 19, 1874. It was referred by each House to its Committee on Public Lands. The committee of the House first considered it, after some delay apparently owing to the pressure of other measures having precedence before the committee, and it was reported favor-

ably to the House on March 17, with a bill providing for a Commissioner of Forestry with facilities for his researches. Owing to the pressure of other business, it is said, before the Senate committee, the consideration of this measure was not reached by it, and the session closed without final action.

Early in the next session (the 44th), Hon. Mark H. Dunnell, who had taken particular interest in the subject, introduced practically the same bill and it received the same reference as before. As before, too, the enthusiasts in the cause of forestry seemed doomed to disappointment, as the session wore away without final action being taken, though many of the members conversed with on the subject expressed themselves as favorably disposed towards the movement. In grasping at the last straw of hope of having something done in the cause of forestry before the close of the session, an alternative of the Forestry Commission plan was thought of. Hon. Mark H. Dunnell secured the adoption of an amendment to an act making appropriations for the current expenses of the Government, in which the Commissioner of Agriculture was directed to appoint a person of approved attainments for prosecuting these inquiries relating to forestry, with powers and duties to be similar to those specified in the bill above mentioned, and the paltry sum of \$2,000 from the moneys appropriated for the purchase of seeds, to be distributed by the Department of Agriculture, was withdrawn for this purpose.

So it was that forestry was made a division of the Department of Agriculture, instead of a Commission of Forestry as first intended. Dr. Hough was made its first chief, receiving his commission from Hon. Frederick Watts, then Commissioner of Agriculture, on August 30, 1876, for prosecuting the inquiries specified and issuing a report upon forestry. The meager appropriation for the service was greatly inadequate for covering the field in the broad manner originally intended, and then the subsequent restrictions, by the Printing Committee, to a volume

not exceed 650 pages compelled the omission of part of the matter which was prepared.

Such were some of the vicissitudes with which the forestry movement in this country had its incipency. The lack of public sympathy and support were discouraging in the extreme to the promoters of the cause. Three years elapsed after the action of the American Association for the Advancement of Science, calling special attention of Congress to the importance of the subject to the vital interests of the country and urging governmental action, before an agent was appointed, notwithstanding the constant efforts of the promoters to help the cause along. Then the ridiculously small appropriation, scarcely providing for the services of a stenographer, and the exasperating restriction by the Printing Committee contrast the difference between the public support of those times and of today, and show the difficulties under which the pioneer Chief of the Forestry Division had to work. Nevertheless, he entered upon his service and finished his first Report upon Forestry so as to deliver it to the Commissioner of Agriculture on the 8th of December, 1877. It was printed and distributed early the next year. The matter withheld from the first report, on account of the limitations of the Printing Committee, appeared in the next two reports.

Quoting from an address subsequently delivered by Hon. Mark H. Dunnell: "The terms under which these reports were made required that the statistics of exportation of timber and other forest products should be reported, and under this requirement a considerable part of the second report is devoted to the statistics which the law demanded. They cover the whole period of our existence as a Government, and, in this particular, they exhaust the whole subject. These reports have been elaborately reviewed and very highly commended in Europe; and in the international geographical congress, held in Venice in September last, they were awarded a diploma of honor.

"In a lengthy review of the first of these reports, by an officer of the Württemberg forest service, since made a professor in one of the German universities, the writer, after noticing the steps that had been taken from the first introduction of this subject, in

1873, to the date of publication, in 1878, says:

"It awakens our surprise that a man not a specialist should have so mastered the whole body of American and European forestry literature and legislation."

POWER DEVELOPMENT ON NATIONAL FORESTS

THE Secretary of Agriculture has issued a permit to the Pacific Light and Power Corporation of Los Angeles, California, to construct and operate a series of power plants in the Sierra National Forest. The company plans to build four powerhouses, two reservoirs, and twenty-five miles of cement-lined tunnels. On account of the magnitude of the construction work and the amount of power to be disposed of, the permit provides for construction extending over a period of twelve years. Under a temporary permit the company has already nearly completed the first step of this development, known as the "Big Creek Project." This work is being done by the Stone and Webster Engineering Corporation.

The ultimate development proposed is about 150,000 horsepower. The greater part of this power will be transmitted 240 miles into Los Angeles and vicinity and will probably be used in large part on further extensions of interurban railway systems. It is also expected that considerable quantities of this power will be utilized in pumping water for irrigation in the upper San

Joaquin valley. The power will be transmitted over a double steel tower line strung with stranded aluminum cables and at a pressure of 150,000 volts, the highest yet attempted in commercial transmission.

This development of the Pacific Light and Power Corporation is one of several under way or projected upon national forest lands in California. Among these are the projects of the Great Western Power Company on the north fork of the Feather River where a reservoir of forty-three square miles is to be constructed and power plants with a capacity of about 350,000 horsepower are to be built. The Southern California Edison Company is planning for the development of four plants on the Kern River. The Pacific Gas and Electric Company is constructing on the South Yuba, one of the highest masonry dams in the world. The greatest waterpower development in the history of the State is now under way and most of the plants proposed or being constructed will occupy national forest lands under permit from the secretary of agriculture.

USING WASTE WOOL.

A toy company at Sheboygan, Wis., started out to use only the waste wood from other mills. It has worked out a system of using all small waste pieces so that practically nothing but the sawdust is lost.

NEW USE FOR BAYONETS.

Army bayonets now form part of the emergency telephone outfit of forestry rangers, used chiefly in fighting fires. This emergency line consists of small instruments and a coil of fine copper wire. The wire is attached to the nearest telephone line, the bayonet is thrust into moist ground at the other end, and with the circuit thus completed the ranger can talk with headquarters, report his position, and summon fire fighters if necessary.

SOCIAL WELFARE AND THE LUMBER INDUSTRY

BY R. C. BRYANT, *Professor of Lumbering at Yale College.*

[Prof. Bryant, who is recognized throughout the United States and Canada as an expert on lumbering conditions and problems, has agreed to supply to AMERICAN FORESTRY each month, an article on some particular phase of lumbering. These will not only be of great interest and importance to the lumbermen of North America but will be read with delight by the foresters and by all who are interested in any way, in lumbering and forestry. They will be a feature which should be eagerly looked for each month.—EDITOR.]

THERE has been a marked change, for the better, during the last few years, in the relation between the employer and the employe. This has been due, in part, to legal enactments, such as the Workmen's Compensation Acts passed by various States, but largely through an increasing realization on the part of the employer that a contented workman is a more efficient man than a discontented one. Much that has been done to increase the comfort and well being of the workman has been voluntary on the part of the employer and many of the ideas that have been put into effect have originated with him.

The men controlling the lumber industry, which provides labor for thousands of men, have kept abreast of the times in developing better conditions for their workmen and in many cases have been in advance of other employers of labor in this country.

Situated in small communities, as many of the mills and logging camps are, the problem of improving the environment of the migratory population that follows saw-milling and logging has not proved an easy task.

The main work has centered around the manufacturing plant since the workmen are more permanent than loggers and because the plant remains in one place for several years, while the logging camps are moved at frequent intervals.

Until the last few years the social welfare work has been conducted independently by the various companies, but the tendency now is for the various

operators, through the lumber manufacturers' associations, to co-operate with the Industrial Committee of the Y. M. C. A. both in the formulation of new ideas and also in the conduct of the work itself.

The methods employed to improve the condition of the workmen are many. As an example of the better type of work being done by some of the lumber companies, that of one in southern Arkansas is of interest. This company, which owns a large tract of timberland, was organized about twelve years ago by progressive lumbermen. At that time the local supply of labor was more or less lawless because of the promiscuous sale of liquor and the presence of undesirable characters that are always found in pioneer communities. From the first, the company realized that efficiency could not be secured unless steps were taken to raise the mental and moral tone of the community. Although this task was attended with many difficulties, due to open opposition on the part of some and a lack of interest on the part of others, the results secured have amply rewarded those who made the effort.

LIQUOR TRAFFIC EXCLUDED.

The mill settlement, a town of approximately 3,000 inhabitants, is known as a "one-man" town—i. e., all property is owned by the company. By this means it is able to exclude traffic in liquor and to debar undesirable characters from residence in the community. The result has been that in a few short years the character of the laboring class has

been changed from an indifferent, semi-lawless one to that of a very high class community, which takes pride in its local institutions. Not only has the tone of the immediate community been vastly improved but also that of the surrounding country.

These results have been accomplished in several different ways, among which are the provision of excellent educational, church and school facilities, the maintenance of strict law and order, and the manifestation of an interest in the workmen outside of the mere labor they are able to perform.

It is a well-recognized fact that progress, mental, moral and civic, can not be made without the aid of schools and churches and in this respect the community above mentioned is well equipped. The school system includes primary, grammar, high school, domestic science and manual training departments. Each year several graduates continue their studies in some of the colleges and universities of the country.

The social life centers around the club house, a large commodious building presented to the town by a former stockholder of the company. This club, which is conducted on plans similar to the Y. M. C. A., affords a meeting and recreation place for the townspeople. A valuable feature of the club house is the natatorium, which contains a large concrete swimming pool and numerous tub and shower baths, all of which are open to the citizens on the payment of a small monthly fee.

Other prominent institutions of the town are a fully equipped hospital with a competent staff, an ice plant, a commissary or store which is as well appointed and carries as large a stock as any store in the State, a modern hotel that is without a peer in the southern part of the State, and a State bank.

Although the town is owned by the company, it is incorporated and the city government is vested in a mayor and board of aldermen elected by the people.

Electric lights, a water system, cement walks, well-painted houses and fences, and oiled streets are some of

the improvements which attract the attention of the visitor to the town. Civic pride is in evidence on all sides and is manifested in well-kept premises and in a spirit of loyalty to the town and its institutions.

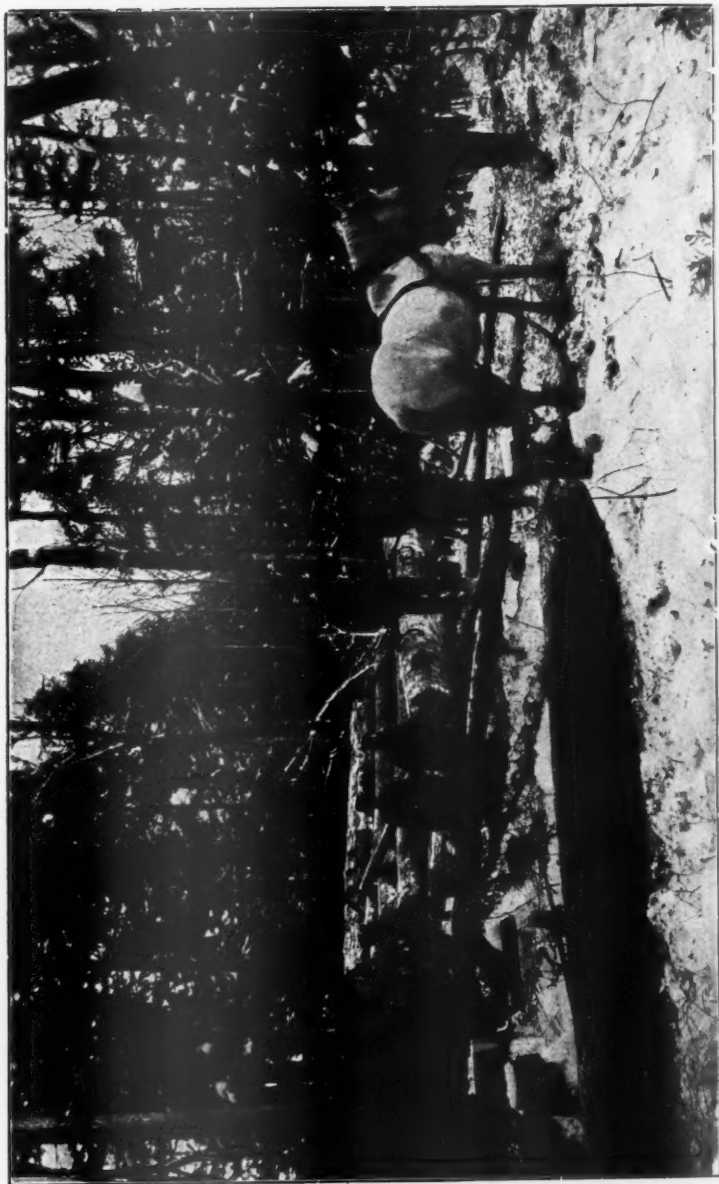
A significant feature of the life of the people is that few seek amusement in other cities, preferring to spend their money at home even if the store and institutions are owned by the corporation for which they work.

SAVING THEIR MONEY.

An interesting phase of development in connection with the community has been the growth of the deposits in the savings bank, an institution established by the company with reluctance, but the necessity for whose existence was demonstrated from the beginning. The deposits are not confined to the white population, for many colored employees have savings accounts.

The foremen in certain parts of the manufacturing operation are now paid a bonus, in addition to their salary. This has led to greater efficiency in work, to reduced cost of operation and to greater satisfaction on the part of the employees.

While it is not uncommon for lumber companies to provide in a greater or less degree the facilities and conveniences mentioned, the company has gone still further and has made it possible for those employees holding the more responsible positions to better their financial condition through the opening of ways and means for the investment of savings. An incorporated employees investment company, organized some time ago, is open to the permanent employees for membership and through this company, savings are invested to excellent advantage. It is a noteworthy fact that employees of lumber companies seldom accumulate a competence, whereas through the influence of the savings banks, the investment company and the encouragement of the officials, hundreds of thousands of dollars have been invested by the employees in sound business ventures.



LOGGERS AT WORK NEAR THEIR CAMP IN THE WINTER.

THE MEN LIKE A CLEAN TOWN.

The sum total of the advantages offered in a town morally clean, with excellent school and church facilities and where law and order are maintained is so much appreciated by workmen that a finer body of lumber employes can not be found anywhere in the country. There are few changes in personnel from year to year because men prefer to remain in a clean town where their families can be reared under the best influences even though a better position, at a higher salary, may be open to them in less desirable communities.

This company has also shown a keen appreciation of the needs of its employes in the logging camps. These are located on high ground and are composed of well-painted, roomy, portable houses arranged in streets with ample space between each family's quarters. Water is supplied from deep-driven wells and is piped to all parts of the camp so that each family can secure pure water from a hydrant close at hand.

An exceptionally good feature of each of the camps is the hygienic provisions made for the protection of the health of the workmen and their families. All latrines are tightly built and are screened to prevent the entrance of flies. Heavy metal garbage cans are placed in close reach of each house and every family is required to place their kitchen refuse in them. Receptacles for holding tin cans and other refuse are also placed nearby. Several times a week all waste material is hauled away from camp and dumped where it will not be a menace to health. Ice is furnished to residents of the camp at a reasonable rate.

The development of a sanitary system, such as is found in the camps of this company, has been the result of a gradual growth since workmen of the type found in logging camps are usually extremely ignorant of the most rudimentary principles of sanitation and in many cases are hostile to improved methods. It would have been impossible to have put any hygienic measures in force without the aid of an efficient

logging superintendent and wide-awake camp foremen in sympathy with the project. A potent factor in bringing about an enlightened attitude on modern sanitary measures has been stereopticon talks on popular subjects, during the course of which slides have been interspersed showing the danger of food infection from flies and other pests and the methods of combatting them. Talks on hygiene are given at occasional intervals by members of the medical force which have also had a marked effect in the formation of a proper sentiment on the subject.

DOMESTIC SCIENCE TAUGHT.

A contented workman must not only make a satisfactory wage, but his body must be well nourished if he is to perform his most efficient work. Realizing this, it has been the custom for the last few years to give instruction in domestic science to the women of the camps. This has aroused a great interest in the preparation of better food and in securing greater food values out of the purchases made at the company store. Frequent entertainments and talks of a popular character are given in the camp school house for the benefit of the residents. These have done much to increase the interest of the workman and their families in outside affairs.

The policy followed by the manager of another plant in the South, located in a town not controlled by the lumber company, differs somewhat from that of the company mentioned. Every employee must send his children of school age to the public schools during the entire session. In cases where the parents have been unable to provide text-books, the manager has furnished them without charge. Other regulations include the affiliation of the parents with some church organization, a high stand for civic righteousness and total abstinence. If a workman refuses to abide by these regulations he must leave the employ of the company. While the policy has met with much opposition, the manager is gaining ground and ultimately will have the satisfaction of having accomplished much good.

The general line of development now

being advocated by those interested in welfare work in logging camps and sawmill communities is the construction of buildings for the operation of Y. M. C. A.'s in charge of paid secretaries. In some cases the buildings are constructed and the expenses met jointly by the lumber company and the community, while in other cases where the community is isolated the entire expense is borne by the lumber company. Organizations with salaried secretaries are maintained by some employers where not more than one hundred men are in the employ of the company. This large per capita expense has been well justified by the improved conditions brought about by the organization.

Very satisfactory results have been secured by one logging company in the West by the use of a Y. M. C. A. car which is moved from one camp to another at frequent intervals.

Beneficial effects of the welfare work as now conducted among lumber company employees are evident in the growth of village pride and community betterment, the installation of "first aid to the injured" appliances and instruction in their use, increasing interest in hygiene and sanitation, the education of the workers through technical training in classes and clubs, the desire to accumulate savings, the elevation of the moral tone of the community, and the provision of wholesome forms of recreation.

The rapid growth of this work during the last few years has shown the need of the movement, and the strong support it has received from lumber operators is ample proof that they are keenly alive to the moral obligations they owe their workmen.

GOVERNMENT TO SELL MORE MONTANA TIMBER

THE Forest Service is receiving bids for 80 million feet of Government timber on the Lolo National Forest of Montana.

The award of bids will be made at the expiration of one month, unless some of the bidders wish further time to examine the timber, in which case the award will be delayed an additional thirty days.

The projected sale is an important one from the Forest Service point of view, for while most of the stand to be sold is timber of good quality, a lot of old fire-damaged trees will be cleared out at the same time. The contract should also prove advantageous to the successful bidder, for the area is near a market and can be readily logged by railroad.

Species represented include 20 million feet of white pine, 20 million spruce, 24 million larch and Douglas fir. The remainder contains white fir,

hemlock, lodgepole pine and cedar. About 6,000 cedar poles and an unestimated amount of shingle bolts, piling and other cedar products are mentioned.

The minimum prices for each class of timber per thousand feet board measure are set as follows: Live white pine, \$4; dead white pine, \$2; saw-timber of other species, \$1. Poles are expected to bring from 15 cents to \$1.50 each, according to size.

The cutting period will extend to January 1, 1920, with a provision for revision of stumpage rates on January 1, 1917.

The gross receipts to the Government from the sale, according to the figures of the Forest Service, will be in the neighborhood of \$125,000, of which 25 per cent goes to the counties in which the forest is situated, with 10 per cent additional to be expended for good roads.

LAUNCHES IN PATROL WORK

Four launches are used in patrol and transportation work on national forests in Alaska, which include many small islands and inlets.

PENNSYLVANIA'S FIGHT AGAINST THE CHESTNUT BLIGHT IS SUSPENDED

ON July 17, 1913, Governor Tener, of Pennsylvania, vetoed the bill appropriating \$100,000 for continuing the work of the Pennsylvania Chestnut Tree Blight Commission during the next two years. This action was taken by Governor Tener because he was advised by the Commissioners that the sum appropriated by the Legislature was inadequate for effectively eradicating the blight according to the plan under which the Commission was working. The sum which had been asked of the Legislature was \$275,000, which was the amount appropriated for the two preceding years. It was felt that the amount asked for was low and would have to be expended very judiciously to accomplish the desired end.

During the past two years the Commission has achieved notable results. An effective fighting force varying from 35 men during the winter weather to 200 during the summer and fall was placed in the field and the entire western half of the State was carefully scouted for the blight. The advance line of the blight extends diagonally across the State through Fulton, Huntington, Center, Clinton, Lycoming and Bradford counties. West of this line the owners were notified as soon as the diseased trees were located and marked. In most cases the owners were very willing to cut the diseased trees and treat them according to the regulations of the Commission, but where owners failed to remove the trees within 20 days after notification, the Commission removed the trees and charged the cost to the owners. In this way over 50,000 diseased trees were removed from the counties west of the advance line, leaving them practically free from blight. In addition thousands of chestnut owners were taught to recognize and destroy the blight. This was accomplished by holding demonstration meet-

ings, lectures at farmers' institutes and at other public meetings, and exhibits placed at county fairs and educational institutions; also by the distribution of bulletins, posters, circular letters and press notices.

Many facts relating to the proper procedure in carrying on the sanitation work have become known only as a result of the work. Before the Commission ceases operations an investigation of the efficiency of the cutting-out method of controlling the disease will be made by the General Superintendent, Mr. S. B. Detwiler, and the results published. The points to be emphasized in eradicating spot infections as given in the report of the General Superintendent for 1912 are as follows:

1. Take all possible care to prevent injuries to surrounding chestnut trees and sprouts in felling the infected tree. If it is necessary to clear away brush to facilitate cleaning up after felling, any small chestnut sprouts should be cut flush with the ground. Experience has shown that such stubs often become infected if near a diseased tree.

2. Cut all stumps as low as possible, to lessen the expense of peeling and to decrease the chance of infecting the new sprouts.

3. Destroy all diseased portions of the tree showing pustules, by burning on the spot, immediately, either the bark or entire sections of the tree which show cankerous areas.

4. Either utilize all unbarked portions of infected trees within a brief time after they are cut, or, if it is desired to permit this material to remain in the vicinity of healthy trees, peel the bark from all portions of the trees which it is desired to retain.

5. In every case, peel the bark clean from the stumps to an inch below the surface of the soil. Experience has shown that the stumps of infected trees and portions of the green tops which

are permitted to lie for several months on the ground, are almost certain to become infected if the bark is permitted to remain on them, even though no cankers exist on the stump at the time the tree is cut. Some of the largest spots of infection have developed from unpeeled stumps. The spores germinate on the sappy surface of the stump and the mycelium grows downward through the cambium, and in the course of a year or two, reaches the sprouts which come up around the base of the stump. Little infection in the sprouts is found where the stumps have been carefully peeled. To be certain to prevent reinfection of the sprouts, the peeled stumps should be sterilized to kill any spores which may still remain. Painting the tops and sides of the stumps with creosote has been found to be the cheapest and most effective means of sterilizing the stumps, but satisfactory work can be done by burning brush on each stump after peeling.

In the eastern portion of the State, where the percentage of diseased trees was so great that the cutting of all infected trees was impracticable, a force of men was employed to interview owners and acquaint them with the facts relating to the blight. East of the advance line, except in the vicinity of chestnut orchards, the Commission did not force the cutting of diseased trees, but used every effort to induce owners to cut and utilize them before they had deteriorated from the effects of insects and wood-destroying fungi. Where the percentage of infected trees is very high, the Commission has recommended that both diseased and sound trees be cut. It was strongly urged that in all cases all merchantable material be removed from the ground immediately, the stumps peeled of bark and sterilized, and all brush or refuse burned.

An office of utilization was opened for the purpose of assisting owners in finding the best markets for their chestnut, thus enabling them to afford the expense of cleaning up the diseased stumps. The marketing of diseased chestnut timber facilitated by bringing buyers and sellers together, and calling

the attention of lumbermen, contractors, and other purchasers of lumber, to the need for concerted action. Several railroads also established special low freight rates on blighted cordwood, the most difficult product to market profitably.

Trained tree surgeons were employed to advise owners of shade and orchard trees how to get the best results in treating individual trees. It was found that there was little recurrence of the blight where the diseased parts were properly cut away, if the trees were sprayed 8 to 10 times during the season with a good fungicide. Where the owners of chestnut orchards in the eastern part of the State kept their trees free from blight, the Commission enforced cutting of all diseased trees within a half mile radius of the orchard. All nursery stock was inspected in the nurseries and carefully reinspected and tagged before shipment.

A large scientific staff carried on investigations on all phases of the disease. Many new and helpful facts concerning the blight have been gained in this way. The following publications have been issued by the Commission:

Bulletin 1.—Chestnut Blight Disease.

Bulletin 2.—Treatment of Ornamental Chestnut Trees Affected with the Blight Disease.

Bulletin 3.—Field Studies on the Growth and Dissemination of the Chestnut Blight Fungus (in press).

Bulletin 4.—The Chestnut Blight Fungus and a Related Saprophyte (in press).

Bulletin 5.—The Symptoms of the Chestnut Tree Blight and a Brief Description of the Blight Fungus.

Bulletin 6.—The Chestnut Tree.—Methods and Specifications for the Utilization of Blighted Chestnut.

The Pennsylvania Chestnut Blight Conference, Harrisburg, February 20-21, 1912.

Report of the Pennsylvania Chestnut Tree Blight Commission, July 1 to December 31, 1912.

It is to be greatly regretted that the work of the Commission is brought to

such an abrupt close. It is the first time in the history of our country that the attempt has been made to combat a fungus disease of our forest trees, and the successful outcome of the Commission's problem would have been noteworthy in the annals of forestry. It would have encouraged the States to the south of Pennsylvania where the chestnut is the most important forest tree to take up the fight and thus save

a great natural resource. It is to be hoped that the fight in Pennsylvania has been temporarily suspended only and not entirely lost, for without Pennsylvania's assistance, there is very small hope of the invaluable chestnut of Ohio, West Virginia, Maryland and Virginia being saved. Pennsylvania's stand of chestnut is conservatively valued at over \$70,000,000.

OVERGRAZED STOCK RANGES CAN COME BACK

THE improved condition of the national forest range after regulated grazing is pointed to by experts of the Department of Agriculture as a demonstration that areas which have been severely damaged through overstocking by sheep and cattle can be brought back to their former carrying power through a system of sufficiently intelligent use.

When the Government took charge of the livestock ranges within the national forests, some of them were so badly overgrazed and otherwise injured from reckless handling of the stock that their grazing value appeared to have been almost entirely destroyed. Many of these ranges, however, have been restored and made as valuable as ever. On several of the forests results have more than justified the expectations and the range is in better condition than it ever was.

An example of this improvement is cited in the Nebo National Forest, Utah. In 1908, when that forest was created, the ranges within the forest boundaries were found to be badly over-grazed and trampled because there was a lack of any control or supervision over the areas. One of the areas was at that time estimated to be capable of carrying only 3,000 head of cattle. Now, through conservative management and judicious distribution of the cattle over the ranges, and improvements in water conditions, the carrying capacity of the range has been increased until, in the present grazing season, nearly 8,000 head of cattle are using this particular area, and forest officers feel that a few hundred head more can be safely grazed there without injury.

ONTARIO WOOD SUPPLIES

OVER 1,200 wood-using industries in Ontario contributed the data for a bulletin on this industry now being issued by the Canadian Forestry Branch, at Ottawa. Thirty-four different kinds of wood are being used by these industries and the detailed information regarding the various uses to which such woods are put, should be of considerable value not only to the manufacturer by showing new means of waste disposal, but also to the house holder by indicating

what native woods are best fitted to replace the more expensive imported stock, for interior decoration, furniture and flooring.

The bulletin also shows incidentally the increasing poverty of Ontario with regard to the more valuable work-woods. Almost half of the thirty-four kinds of wood used are obtained principally from outside sources and three and one-half million dollars are annually sent out of the province for imported wood stock.



WOON YOUNG CHUN, THE YOUNG CHINESE STUDENT OF FORESTRY AT
THE NEW YORK STATE COLLEGE OF FORESTRY, SYRACUSE.

CHINA'S INTEREST IN FORESTRY

MR. WOON YOUNG CHUN, a young Chinese, who is a student at the New York State College of Forestry, believes that reforestation will do much toward lessening the frequent devastation of districts in the Chinese republic by food and famine.

Mr. Chun is a son of the late Oi Ting Chun, of Shanghai, who held many positions of trust under the Manchu dynasty, among them being the directorate of railroads in northern and southern China and that of Minister to Cuba.

He is credited with being one of the best Chinese students of the English language in the empire. Prof. Frank F. Moon, who was an instructor of Mr. Chun when he was at the Massachusetts State Agricultural College in Amherst, believes that he is the only Chinese undergraduate student in forestry in this country.

"My ambition is not to become a working forester," he said in English that would do credit to an educated American. "My desire is to be a public educator in forestry science through

lectures illustrated with stereopticon views taken from the wooded and residential sections of America.

"It is only since the Republican form of Government has been established that China has awakened to the need of greater forest tracts and this awakening is confined to the more progressive and better educated men and not to the great mass of people.

"The denuding of forest lands has been slow but steady and the effects are now being felt keenly. Cutting timber has not been a commercial enterprise, but has been done as the lumber has been needed for homes and general use.

"It is not so many years ago that the scarcity was felt so keenly that bamboo, which grows rapidly, was selected for house building, furniture and other commodities. Brick, stone and mud are used for homes because there is not wood enough.

"There are fine forests in China yet, but they are inaccessible and comparatively useless in preventing floods. No man can hope to arouse the Chinese to the need of tree planting from a patriotic standpoint, but it can be done from the viewpoint of commercialism.

"That is my idea. If I can obtain the degree of bachelor of forestry and master of forestry I shall return to

Shanghai and begin a long lecture campaign that will be carried into every part of the empire.

"I am studying photography for the express purpose of supplying myself with photographs that can be made into lantern slides.

"Forestry will some day become one of the greatest fields of Government work in China. At present most of this work, the amount of which is hardly worth mentioning, is done by German foresters, but as fast as they can be educated Chinese will fill such positions as State foresters, superintendents, surveyors, rangers, clerks and timber experts. There are twenty-one provinces in China each of which will have to have a head forester.

"The first work to be done will be the mapping of the entire country's forest area, a gigantic proposition, but one which the Government stands ready to undertake when trained men can be obtained. I hope to be in the field within the next three years."

Mr. Chun is a private student and is being trained at the expense of his relatives, who are wealthy natives of Shanghai and belonged to the highest caste before class distinctions were abolished.

COOPERATIVE STUDY OF FOREST CONDITIONS IN NORTH CAROLINA

THE Secretary of Agriculture recently signed an agreement with the State of North Carolina for a co-operative study of forest conditions in the eastern Piedmont region. The work will be carried on by the Forest Service and by the State geological and economic survey with one-half of the cost paid by each.

The study will determine the distribution and proportion of forest lands, and the relative value of lands for timber and for agriculture. It will take into account the present status of lumbering, the causes and effects of forest fires,

and will recommend a system of fire protection and of forest planting.

The study just arranged supplements two already completed in the more mountainous regions of the State. The first, a study of forest conditions in the Appalachians, has been published as a State report. A study of the forests of the western Piedmont region was completed recently and the results are being prepared for publication. When the study of the eastern Piedmont region is finished it is planned to proceed to a similar study of the coastal plain region, so that eventually the entire State will be covered by a forest survey.

FIRES ON NATIONAL FORESTS

AS the summer progresses without heavy fire losses on the national forests, the Forest Service is having higher hopes for small fire damage during 1913. Not only has the fire loss on national forests to date been gratifyingly small, but conditions everywhere except in the southwest, according to the officials of the Forest Service, are more than ordinarily favorable. They point out, however, that the situation may change almost over night, and that a comparatively short period of general dry weather and high winds may bring disaster. The appropriations for fire fighting are not yet large enough to insure immunity from heavy losses.

A system of telegraphic reports from the field keep the chief forester at Washington informed as to conditions on the 163 forests under Federal super-

vision. During the past week general rains in the far western States, with the exception of Arizona and New Mexico, have reduced the present fire danger to a minimum. But in the latter two States the weather is reported very dry, with occasional electrical storms that bring chances for fires set by lightning. Four fires are burning on the Coconino forest in Arizona, and during the past week there have been fifty-eight fires all told in the two southwestern States. The acreage burned is reported as 2,090 acres, as against only 20 acres reported burned on national forests in all the other western States.

Thus far this season there have been 30,798 acres burned over on the national forests, or only sixteen-thousandths of one per cent of the acreage which the forests include.

PARTICIPATE IN NATIONAL FOREST ADMINISTRATION

TO give settlers and other local users a larger voice in national forest administration, Secretary of Agriculture Houston has just promulgated a new regulation which goes into effect at once, providing a means by which the forest service may systematically co-operate with duly organized associations of such users.

Any association whose members include a majority of the local residents making use of the national forests may get together and select a committee, to meet with the local forest officers. This committee will be recognized in an advisory capacity in settling questions which may arise between the forest service and the public in the use of the forests.

The exact wording of the regulation is:

"Wherever any association whose membership includes a majority of the local residents using a national forest,

or portion thereof, for like purposes, shall select a committee, an agreement on the part of which shall be binding upon the association, such committee, upon application to the District Forester, may be recognized in an advisory capacity on behalf of the association, and shall be entitled to receive notice of proposed action and have an opportunity to be heard by the local forest officer in reference to any proposed changes likely to materially affect the use or interest in the forest or portion thereof enjoyed by such permittees. The general principles of recognition and responsibility governing co-operation with live-stock associations are herewith extended, so far as they are applicable, to the other regular lines of business conducted on the national forests."

The object of this regulation is to extend what may be called home participation in national forest management. It is recognized that the best use of the

forests in the interest of the general welfare means the promotion of local welfare, and that the forests must be handled with careful consideration for all local interests involved. It is recognized also that public confidence in the spirit of fairness with which individual citizens are treated is essential, and that local participation in the settlement of many questions is the best possible safeguard against arbitrary or unwise decisions by local forest officers.

In other words, it is desired to prevent any local feeling that a western user in contact with the national forest administrative system is up against a far-away bureau at Washington, represented on the ground by a forest officer who can do as he chooses and against whose actions it is impossible to make effective protest. In the case of the grazing regulations a method of co-operation between the forest service and users of the forest ranges has been developed which is said to have done away completely with any such feeling. Cattle and sheep growers' associations not only assist in the settlement of disputes concerning individual privileges, but also join in the formulation of plans for the best use of local ranges and through their national associations are given an opportunity to be heard before regulations which affect their industry as a whole are adopted. The local associations insure attention to complaints of unfair action which are found to be justified, while on the other

hand they automatically dispose of many cases of complaints that are found, when all the facts are considered, not well grounded.

It is the announced policy of the department to favor the greatest good to the greatest number, and the local user over others. With the help of the advisory boards now provided for, many of the problems affecting individuals which the application of such a policy involves can be settled by submitting them to what is practically the organized public sentiment of their own neighbors. On the other hand, the organization can initiate questions and bring them to the attention of the forest service, backed by the voice of the majority of those who are dependent upon the forest industries.

Already several associations besides those composed of stockmen are co-operating with the forest service, though there was no provision for their official recognition before the new ruling of the Secretary went into effect. One of the pioneers was the Malad Forest Users' Association, composed of men who reside in or near the Pocatello Forest which lies on the border of Utah and Idaho. The advisory board of this association has acted as a clearing house for complaints and a medium through which mutually advantageous understandings might be reached. It is said to have saved its members and the forest service much trouble, embarrassment, and even litigation.

ENLARGING CANADIAN RESERVES

A bill is to be introduced by the Dominion government enlarging the western forest reserves from 25,000 square miles to 35,000 square miles. The chief reservation in the West, the Rocky Mountain Forest Reserve, is to be increased in area 2,680 square miles, and a new reserve of over 5,000 square miles is to be created in the Peace River country, close to the Lesser Slave Lake.

PROFIT IN GERMAN FORESTS

On the best German forests the annual expense is \$13 an acre, but the gross returns are as much as \$24; thus they yield a net return of \$11 an acre each year.

USING UTAH FORESTS

More persons make use of the national forests in Utah than in any other State. Nearly 27 per cent of all the permits for sheep and cattle grazing on the forests are taken out in this State. This does not mean, however, that Utah carries one-fourth of all the national forest cattle and sheep; it happens that many small grazing interests make use of the forests there; and individual flocks and herds are larger elsewhere.

A CORRECTION

AN unfortunate error occurred in the report of the second bill recently passed by the Pennsylvania Legislature as given on page 481 of *AMERICA FORESTRY* for July. In section 3 on line 3 from the end of the section, the word "mileage" should read "millage" so that the sentence shall read:

"Prorata based upon the last assessed millage of taxation for county, poor, road, and school purposes within said taxing district."

Other corrections which will add to the clearness of the text are:

Page 480, omit "and" which is the last word in the sixth line from end of section 3.

Page 480, fifth line from end of section 5, insert word "for" between words paid and out, making the phrase, "paid for out of moneys."

Page 481, first column, sixteenth line from bottom, insert "the" between by and filing, making the reading "by the filing."

KILLING THE GYPSY MOTH

Observations recently made throughout the moth infested territory of Massachusetts by State Forester Rane show the presence of the *Calosoma* beetle in large numbers. This imported natural enemy of the gypsy moth is apparently multiplying very fast, which encourages the belief that it is going to prove an important factor in holding

the gypsy moth in check. As the State Forester has pointed out many times in bulletins and in the press, it is not hoped that any one parasite or predatory insect can overcome the moth alone, but with a dozen or more species of beneficial insects already established and gradually multiplying, the future outlook is decidedly encouraging.

BOOK REVIEWS

Parts four, five and six of Mr. W. F. Goltra's "Some Facts About Treating Railroad Ties" have been received, it being a publication of 88 pages. Mr. Goltra continues, in it, the discussion about the different methods of treating ties which was started in the first editions. The latest includes a paper by Howard Weiss on a comparison of zinc chloride with coal tar creosote for preserving cross ties, a discussion of this paper by Mr. Goltra; a history of wood preserva-

tion by the author, and a treatise on timber treating plants of North America illustrated with a map showing the forest regions and the timber, location of timber treating plants in North America. There is also an article on the preliminary treatment of timber by David Allerton and comments on it by Mr. Goltra. The book will be found of value and interest by lumbermen and foresters as well as lumber preservers.

NEAR SILK MADE OF WOOD.

Much of the so-called silk nowadays is made of wood. Germany produces more than one million pounds of this cellulose silk, worth \$1,500,000. A ton of wood worth \$10 yields cellulose worth \$20, and this cellulose yields silk worth \$850.

AMMONIA BOMBS FOR FOREST FIRES

Ammonia bombs are being tried out on some of the national forests for the purpose of extinguishing forest fires. They are said to have worked well in the case of brush fires, where the fire-fighters find difficulty in getting near enough to the burning area to beat out the flames. Each bomb exploded will extinguish fire in a circle of about five yards in diameter.

STATE NEWS.

Michigan.

A resolution recently adopted by the Public Domain Commission places the Siskiwi Islands, off Isle Royale in Lake Superior, and all the State lands in Isle Royale into a permanent State Forest and Game Reserve. These islands are a part of Keweenaw County. The Island Copper Company, which controls about 90,000 of the total area of 120,000 acres, has offered to co-operate with the State in maintaining the entire island as a refuge for wild game and birds, as well as a forest reserve.

Active work has been started on the Fife Lake State Forest, which was set aside as a forest reserve by the Public Domain Commission in 1910. This forest embraces about 7,500 acres of State lands in the southeastern corner of Grand Traverse County. Rangers' headquarters have been established, and fire lines are being constructed along the lines of the G. R. & I. and M. & N. E. railroads, both of which traverse this tract. A growth of young, medium sized, and mature jack pine and oaks covers portions of this forest, but much of the land is practically destitute of tree growth and such areas will have to be artificially reforested. Planting stock for this purpose will be supplied from the Higgins Lake forest nursery.

The work that is being undertaken on the Fife Lake Forest is in line with the policy of the Public Domain Commission to bring all of the State Forests, aggregating approximately 300,000 acres, under conservative management as rapidly as the funds available for this purpose will permit. Until this year the annual appropriations for forestry purposes have been, not only inadequate for developing any of the more recently established State Forests, but, barely sufficient to meet the cost of maintaining and protecting the Higgins and Houghton Lake Forests in Roscommon and Crawford Counties.

Improvements for better protection against forest fires are being made on the Higgins and Houghton Lake Forests this summer. The system of fire lines at each place is being extended by the construction of many miles of new lines. Two steel observation towers, each sixty feet high and connected with headquarters by telephone, will be erected.

The law empowering the Public Domain Commission to exchange lands with individuals and the Federal Government is being brought into service. Applications covering thousands of acres of interior holdings within the State Forests have been received from owners, who are desirous of

exchanging for the scattering State land without. This will materially assist the State in consolidating its holdings, so that eventually all of the State Forests will be blocked into compact tracts.

North Carolina.

Through the courtesy of the officers of the Pennsylvania Forestry Association and other bodies responsible for the forest fire circular which has been distributed among the school children of Pennsylvania, and later, by permission, to the school children of Massachusetts, the North Carolina Geological and Economic Survey has adapted this circular for similar use in this State. The first edition of this circular has been printed, and is now being introduced to the public school teachers of the State through the teacher's institutes and the summer schools. Later on, when the regular work of the schools is taken up, a sufficient number of these circulars will be sent to all the teachers in the State so that every child in the schools may have one. It is realized that the only way to put forest protection on a permanent basis is to train up the children with a realization that the forests must be protected. This circular, printed in red and black, and illustrated to draw and hold the attention of the child, is admirably adapted to interest children and even older people in this most important question. The North Carolina Forestry Association is co-operating with the Survey in this work and it is hoped that all the school children of the State will be reached as soon as the necessary funds are available.

The Study of Forest Conditions of North Carolina begun in 1910, in co-operation with the U. S. Forest Service, has been taken up again this summer. The State Forester, assisted by Mr. T. V. Keefe, of the Forest Service, is now at work in the central part of the State, and it is expected that ten or twelve of the eastern Piedmont counties will be covered during the present season. Rough estimates of the percentage of forest land, the amount, kind and quality of standing timber, and the rate at which it is being cut are made. A general study of the wood-using industries is also gone into. This is the great furniture manufacturing part of North Carolina, as many as fifty wood-using industries, outside of sawmills, being found in a single county in this region. One bulletin, "The Forest Conditions of Western North Carolina," has already been published as a result of this study; and, as soon as the Piedmont region is completed, a second one will be issued on this part of the State.

Oregon.

During June three new fire patrol organizations were formed in Oregon, one covering Josephine County, one Baker, and one Wallowa and Union Counties. The advisability of an organization for Crook County is being discussed by the owners in that section.

With the formation of these patrol associations, there remain only five (5) counties west of the mountains, and three (3) in Eastern Oregon requiring such organizations. Counties in the State now organized for fire protection purposes number seventeen (17.)

There are now some 125 State and private patrolmen on duty in the State, and this number will be more than doubled during July.

A much larger amount of trail and telephone line building has been done this spring than ever before.

It is the opinion of both the Oregon Forest Fire Association and the State Forester that precautions taken this spring reduce the chances of disastrous fires becoming started in Oregon this year, below those of any previous season. Precipitation during June has been heavy.

Maryland.

The State Forester of Maryland, F. W. Besley, began the summer's field work during the latter part of June. The plans for the summer include a study of the scrub pine to determine rate of growth; yield of even aged stands and its utilization for pulp wood and other uses; the surveying and valuation of lands along the Patapsco River for the new \$50,000 State Forest Reservation; a

study of the damage done to growing timber by forest fires with a view to establishing simple methods of appraising damage such as can be used by the Forest Wardens; a local study to determine the most practicable utilization of timber killed by the chestnut bark disease; establishing experimental sample plots on the State Forest Reserves in western Maryland to demonstrate the best methods of handling woodlands in the mountain counties; a study of the red gum to determine its rate of growth, yield in pure stands, uses and value; investigation of the basket willow plantations of which there are many in the vicinity of Baltimore, Maryland, ranging high among the States in the quantity of rods produced and in the excellence of the product.

The field force consists of Chapin Jones, the Assistant State Forester, Yale Forest School, '09; W. G. Schwab, Yale Forest School, '13; J. A. Cope and G. H. Sadler, students of the Yale Forest School; K. E. Pfeiffer and H. B. Steer, students of the Forest School of Cornell University, and J. G. Dorrance, Biltmore, '10.

The National Forestry and Park Association of Maryland was incorporated a short time ago, among the incorporators being some of the best known and most influential business and professional men in the State. The purpose of this organization is to promote the project of establishing a National Forest Park in the vicinity of Washington, the bulk of which would lie in the State of Maryland. There is a considerable area of woodland northeast of Washington available for this purpose and the movement has received very strong endorsement. Favorable legislation toward the creation of the Park is expected from the next session of Congress.

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